SEDIMENT MANAGEMENT ANNUAL REVIEW MEETING
MAY 7, 2003
MINUTES

Prepared for:

U.S. Army Corps of Engineers, Seattle District
4735 East Marginal Way South
Seattle, Washington 98124

Prepared by:

Anchor Environmental, L.L.C.
1423 Third Avenue, Suite 300
Seattle, Washington 98101

September 2003

TABLE OF CONTENTS

List of Acronyms

AET	Apparent effects threshold
BCOC	Bioaccumulative chemicals of concern
BMP	Best Management Practices
BT	Bioaccumulation trigger
BWG	Bioaccumulation Work Group
CAD	Confined Aquatic Disposal
CSMP	Cooperative Sediment Management Program
CSO	Combined sewer overflow
cy	Cubic yards
DMEF	Dredged Material Evaluation Framework
DMM	Dredged Material Management
DMMO	Dredged Material Management Office
DMMP	Dredged Material Management Program
DMMU	Dredged Material Management Unit
DNR	Washington State Department of Natural Resources
Ecology	Washington State Department of Ecology
ECRT	Electrochemical Remediation Technology
EPA	U.S. Environmental Protection Agency
EPTA	PSDDA Evaluation Procedures Technical Appendix
ERDC	Environmental Research and Development Center (formerly WES)
ESA	Endangered Species Act
GP	Georgia Pacific Corporation
IDW	Inverse distance weighting
K_{ow}	Octanol-water partitioning coefficient
LDW	Lower Duwamish River
ML	Maximum level
MTCA	Model Toxics Control Act
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NRDA	Natural Resource Damage Assessment
PAH	Polycyclic aromatic hydrocarbon
PCB	Polychlorinated biphenyl
PSDDA	Puget Sound Dredged Disposal Analysis
PSEP	Puget Sound Estuary Program
PSNS	Puget Sound Naval Shipyard
RDS	Regional Dredging Team
RI/FS	Remedial investigation/feasibility study
RSET	Regional Sediment Evaluation Team
SAIC	Science Application International Corporation

SAP	Sampling and Analysis Plan
SAPA	Sediment Sampling and Analysis Plan Appendix
SEDQUAL	Sediment Quality Information System
SL	Screening level
SMARM	Sediment Management Annual Review Meeting
SMS	Sediment Management Standards
SPI	Sediment Profile Imaging
SQV	Sediment quality values
SVPS	Sediment vertical profile system
TBT	Tributyltin
TMDL	Total maximum daily load
TTL	Target tissue level
USACE	U.S. Army Corps of Engineers
VCP	Ecology's Voluntary Cleanup Program
WDFW	Washington State Department of Fish and Wildlife
WES	USACE Waterways Experiment Station (now called the Environmental Research and Development Center = ERDC)

SEDIMENT MANAGEMENT ANNUAL REVIEW MEETING MINUTES

The Cooperative Sediment Management Program (CSMP) held its annual review of dredging/disposal and sediment management issues on May 7, 2003. This Sediment Management Annual Review Meeting (SMARM) was hosted by the Seattle District U.S. Army Corps of Engineers (USACE) and was held in the Galaxy Auditorium of Federal Center South in Seattle, Washington. The SMARM serves as the formal Annual Review for the Dredged Material Management Program (DMMP), and serves as an informal Annual Review/ Information Meeting for the Washington State Department of Ecology's (Ecology) Sediment Management Standards (SMS) Program. The DMMP is an interagency cooperative program for dredged material management that initially began with the Puget Sound Dredged Disposal Analysis Program (PSDDA) and was later expanded to encompass Grays Harbor/Willapa Bay, and Lower Columbia River within Washington State. The DMMP agencies include the USACE, Seattle District; the U.S. Environmental Protection Agency (EPA), Region 10; the Washington State Departments of Natural Resources (DNR) and Ecology. The meeting agenda is provided as Attachment 1, the list of attendees is provided as Attachment 2, and the presentation materials of the individual speakers is provided as Attachment 3.

MORNING SESSION

Welcome and Opening Remarks

1. Diane Parks, Chief of Operations, USACE, Seattle District, welcomed all to the 15th annual review meeting. Ms. Parks introduced the individuals representing the DMMP agencies and the SMS program and provided a brief explanation of the purpose and objectives of the SMARM. Ms. Parks emphasized the importance of obtaining public input on the proposed changes and ongoing activities. She then introduced Colonel Robert Graves, Commander, USACE, Seattle District.

Col. Graves emphasized the importance of the work being done and acknowledged the philosophical dilemma of how to reconcile the competing demands of economic development and environmental protection. Col. Graves feels that the SMARM process involving the state and federal agencies, the ports, and individual citizens is critical. This process allows all parties to get together to communicate the issues with good will, seeking to arrive at some type of solution within the framework of the laws provided to meet everybody's interests.

Ms. Parks provided a brief preview of the topics to be presented.

Slides

PP 1.1	Sediment Management Annual Review Meeting
PP 1.2	2003 SMARM
PP 1.3-1.4	Meeting Objectives and Purpose
PP 1.5-1.6	Agency Summary Reports
PP 1.7-1.9	DMMP/SMS Presentations
PP 1.10	Regional Sediment Team Update
PP 1.11	Topical Presentations
PP 1.12	Public Issue Papers
PP 1.13	Summary and Closing

Agency Summary Reports

2. Summary of DMMP Testing Activities (Dr. David Kendall, USACE-Dredged Material Management Office [DMMO]). Dr. Kendall provided an overview of DMMP activities for 2003, which he broke down into the following categories: Changes made to the 2002 DMMP management plan, an overview of dredging year 2003 testing activities, ongoing DMMP projects, and ongoing technical/policy actions and issues.

Post-2002 SMARM changes that have been implemented in the DMMP were summarized, which include the following: Ammonia and amphipod testing clarification, recency guideline clarification, and an increase in the volume trigger for disposal site monitoring.

Dr. Kendall then summarized testing activities associated with the 2003 dredging year (June 16, 2002 to June 15, 2003). During the dredging year there were a total of twelve suitability determinations completed and two recency extensions comprising a total volume of 2,379,990 cubic yards (cy) of proposed dredged material tested. Of the tested material, 59,770 cy (2.5 percent) (spread out among six different projects) was determined to be unsuitable for unconfined open water disposal. Seven of the tested projects passed all DMMP disposal guidelines for unconfined open water disposal for all tested material. Two projects involved recency retesting of previously suitable material, which concluded that approximately 45 percent of the material was determined unsuitable for unconfined open water disposal. One project required and conducted bioaccumulation testing for tributyltin (TBT), which continues to be an important chemical of concern to the program.

Projects greater than 100,000 cy were summarized, with the USACE Grays Harbor maintenance dredging project being the largest by far with 1,860,000 cy, followed by the Port of Tacoma's Pierce County Terminal project with 205,000 cy for the latest project addendum. (The total project will involve the removal of 2.3 million cy of material).

Biological testing and problem chemicals observed during the 2003 dredging year were summarized. Only 15 dredge material management units (DMMUs) underwent biological testing in the 2003 dredging year, which is less than previous years. Of those 15 DMMUs tested, the amphipod bioassay turned out to be the most sensitive species of the three. Problem chemicals for 2003 were the typicall ones that show up and included arsenic, TBT, polychlorinated biphenyls (PCBs), and polycyclic aromatic hydrocarbons (PAHs).

Two ongoing/future projects were mentioned. The Port of Tacoma Blair Bridge Widening (Inner Reach Cutback) has 265,000 cy of material proposed for dredging; the sampling and analysis plan for this project has been submitted for DMMP review. The Port of Tacoma Turning Basin Expansion project has approximately 2,200,000 cy of material proposed for dredging; the sampling and analysis plan for this project is currently under development.

Dr. Kendall described action issues for the DMMP, including placement of 300,000 cy of beneficial use material to be placed on South Beach in Half Moon Bay and proposed Commencement Bay disposal site monitoring (which Peter Leon of the DNR will discuss later in the program). Further evaluation of the capacity of the Commencement Bay disposal site is ongoing, which includes in part an evaluation of the predicted dredged material footprint and likely mound height evaluation using the ST-Fate model. The revised bioaccumulative chemicals of concern (BCOC) list and interim bioaccumulation triggers have been proposed for implementation. (Erika Hoffman will be providing more detail on this later on in the program.)

Dr. Kendall briefly described the ongoing policy and technical deliberations that the DMMP is dealing with including the determination of when material above mean/ordinary high water will be characterized under the DMMP. (This is a topic that Tom Gries will discuss further in the program.) The effects of dredging and disposal on invasive species distribution is an ongoing issue that the DMMP is engaged in with the Washington Department of Fish and Wildlife (WDFW). Assessing the future Commencement Bay disposal site capacity is also an issue that the DMMP agencies are evaluating, primarily to address present and future proposed Port of Tacoma development projects).

Dr. Kendall then provided the DMMP website address (http://www.nws.usace.army/mil/PublicMenu/Menu.cfm?sitename=dmmo&pagename=home) and encouraged people to go to the DMMP website to keep up to date on the current issues in the program.

There were no questions.

Slides

PP 2.1 Dredging Year 2003 Testing Activities (DMMP Program)
PP 2.2 Overview of DMMP Program Activities
PP 2.3 Post 2002 SMARM Changes Implemented in DMMP
PP 2.4 Adaptive Management
PP 2.5-2.6 Dredging Year 2003 (testing activities)
PP 2.7 Dredging Year 2003 Bioassay Testing Summary
PP 2.8 Problem Chemicals for 2003
PP 2.9 Ongoing/Future Projects
PP 2.10 DMMP Ongoing Action Issues
PP 2.11 Policy Deliberations
PP 2.12 DMMP Ongoing Technical/Policy Action Issues
PP 2.13 For more DMMP information
PP 2.14 The End

3. Summary of DNR Disposal and Monitoring Activities (Peter Leon, DNR). Mr. Leon focused his discussion on the 2002 tiered partial monitoring that took place at the Elliott Bay disposal site. He discussed the monitoring tools used and how they fit in with the monitoring framework. The monitoring tools consisted of: sediment and tissue chemistry, sediment vertical profile system (SVPS), bioassay, and benthic infaunal community structure analysis. Mr. Leon referred individuals to the 2002 Monitoring Report for specifics regarding what data were collected at what locations. There were some modifications to the traditional monitoring done this year to better assess the site including: analysis of BCOCs at perimeter and onsite stations (which Erika Hoffman will address later) and the addition of methyl mercury analysis to address bioavailability concerns.

Mr. Leon provided a summary of the 1988 baseline conditions for the Elliott Bay disposal site followed by summaries of the 1990 "partial" and 1992 and 2000 "full" monitoring activities. Mr. Leon then went on to describe the 2002 tiered partial monitoring results which included an evaluation of SVPS imagery, sediment chemistry and bioassay data, tissue data, benthic infaunal community structure analysis, and benchmark station analysis (which was not fully implemented). In addition, the 2002 monitoring activities included the analysis of Molpadia tissue and co-located sediment samples for the new BCOC list (which Erika Hoffman will address in detail later).

Based on the results of the 2002 tiered partial monitoring results, Mr. Leon discussed the following questions:

Question 1: Does dredged material remain on-site?

Hypothesis 1: Dredged material remains within the site boundary.
Not Rejected. Based on SVPS survey results.
Hypothesis 2: Chemical concentrations offsite do not increase due to disposal.
Not Rejected. Chemical concentrations did not measurably increase over time due to disposal.

Question 2: Has dredged material disposal caused biological effects conditions to be exceeded?

Hypothesis 3: On-site chemical concentrations don't exceed Site Condition II guidelines.
Not Rejected. No PSDDA maximum level (ML) exceedances were found.
Hypothesis 4: Sediment toxicity doesn't exceed Site Condition II guidelines.
Not Rejected. All three on-site stations passed bioassay interpretive guidelines.

Question 3: Are unacceptable adverse effects occurring off-site due to disposal?

Hypothesis 5: No significant increase in chemical body burden of benthic infaunal taxa.
Not Rejected. No significant change in mercury concentrations.
Hypothesis 6: No significant decrease in abundance of dominant benthic infaunal taxa.
Tentatively Not Rejected. Decrease in dominant infaunal species abundance down-current of disposal site is understood as a natural fluctuation and also may be due to differences in the data evaluation processes used when evaluating the 1988 data and the 2002 data.

Mr. Leon then mentioned future monitoring activities, which include monitoring of the Commencement Bay disposal site this summer, and additional monitoring of the Elliott Bay disposal site, which will occur when the DMMP agencies determine that the volume trigger of 500,000 cy has been met.

Mr. Leon then briefly listed the volume of dredged material disposed of at each of the Puget Sound open water disposal sites.

There were no questions.

Slides

PP 3.1 2002 Tiered Partial Monitoring at the Elliott Bay Disposal Site
PP 3.2 Agenda

PP 3.3 The Rules
PP 3.4 DMMP Sites in Puget Sound
PP 3.5 Elliott Bay Disposal Site
PP 3.6 Monitoring Framework
PP 3.7 Tiered Partial Monitoring Tools
PP 3.8 2002 Modifications
PP 3.9 Summary of 1988 Baseline Conditions
PP 3.10 Summary of 1990 "Partial"
PP 3.11 Summary of 1992 "Full"
PP 3.12 Summary of 2000 "Full"
PP 3.13 2002 Results
PP 3.14 Sediment, Tissue, & SVPS
PP 3.15 Sediment Vertical Profile System (SVPS)
PP 3.16 Elliott Bay Disposal Site Location and SVPS Data
PP 3.17 Sediment Chemistry
PP 3.18 Tissue Chemistry
PP 3.19 Bioassays
PP 3.20 Benthic Community Analysis
PP 3.21 Benchmark Station Analyses
PP 3.22 Special Studies
PP 3.23-3.25 Evaluation of 2001 Data
PP 3.26 Future Monitoring at Elliott Bay
PP 3.27 Puget Sound Site Reports

4. Summary of SMS Cleanup Activities (Kathryn Carlin, Sediment Management Unit Supervisor, Ecology). Ms. Carlin introduced Ecology's new hire (from DNR), Ted Benson, who will be working primarily on Ecology's Federal Facilities and Natural Resource Damage Assessment (NRDA) projects. Ms. Carlin discussed the status of the establishment of the freshwater sediment quality guidelines for Washington State. Phase 1 involved review of the existing North American freshwater sediment guidelines, and the resulting report makes recommendations for use based on reliability analyses comparisons between freshwater quality criteria data sets. Phase 1 activities also resulted in the development of a more robust Sediment Quality Information System (SEDQUAL) bioassay interpretation tool. Copies of Ecology's resulting Phase 1 report are available.

Phase 2 is being completed and the report will be available after June 30, 2003. Phase 2 efforts resulted in the following:

- The development of and subsequent recommendation for revised freshwater sediment quality guidelines based on apparent effects thresholds (AETs)

- New benthic infauna data analysis tools being incorporated into SEDQUAL (to be covered by Martin Payne later on in the program)
- Recommendations for the use of spatial analysis/fields for SMS programs (to be covered by Maureen Goff during her presentation).

Ms. Carlin mentioned that later on in the program Dr. Teresa Michelsen will present preliminary results of her work to update freshwater sediment AETs, including the development of a new "Floating Percentile Method" to calculate sediment quality values (SQVs). Ecology will have an implementation period where the recommended freshwater sediment quality guidelines will be used and will consider updating the SMS to incorporate the freshwater sediment quality criteria should the implementation prove successful.

Ms. Carlin announced the finalization of the Sediment Sampling and Analysis Plan Appendix (SAPA) which can be downloaded from Ecology's website at http://www.ecy.wa.gov/programs/tcp/smu/sapa/sapa.htm.

Ms. Carlin proceeded to discuss Ecology's sediment source control activities including updates to the Sediment Candidates for the 2002 303(d) Comparative Waterbodies List, which will be available for public comment in July with the final scheduled for submittal to EPA for approval in October. Details on submitting sediment data for the 303(d) assessment can be found on the following website http://www.ecy.wa.gov/programs/wq/303d/2002-revised/2002-index.html. Ecology will accept data at anytime, but emphasized that it be in SEDQUAL format. In addition, Ecology will address whether a lower Duwamish Waterway sediment total maximum daily load (TMDL) can be assessed at this time. Ecology is also working with the Navy to develop sediment TMDLs for Sinclair and Dyes Inlets. Ecology continues to provide technical assistance to their National Pollutant Discharge Elimination System (NPDES) permit managers as well to minimize potential impacts to sediment from point discharges.

Ms. Carlin went on to discuss the status of some key sediment cleanup sites including:

- **Bellingham Bay Demonstration Pilot Project.** Remedial activities currently underway are:
  - Marine Services NW and Gate II/Welcraft – Agreed orders have just been negotiated for interim action remedial investigation/feasibility studies (RI/FS), which have been released for public comment, for both sites
  - Olivine and Harris Avenue Shipyard sites – Draft RI/FS is due for both projects by the end of the year
  - Taylor Avenue Dock – Post construction sediment sampling will occur under a DNR lease this summer

- Whatcom Waterway – Georgia Pacific (GP) and Ecology are currently working together to develop a draft Cleanup Action Plan for the site
- GP Log Pond – Capping took place two years ago and recovery at this site has exceeded Ecology's expectations
- Chevron and Colony Wharf Boatyard– Conducting cleanup under Ecology's Voluntary Cleanup Program (VCP)
- Cornwall Avenue Landfill and RG Haley – RI/FS drafts are due middle of this year for both projects

- **Lower Duwamish Waterway source control.** Ms. Carlin stated that revisions to Ecology's source control strategy continue and that they are currently scoping the Duwamish/Diagonal combined sewer overflow (CSO) source control plan. Ms. Carlin mentioned that the Norfolk CSO cap investigation confirmed PCB recontamination, and that Boeing has addressed the PCB recontamination issue by initiating a VCP with Ecology.
- **Cascade Pole (Budd Inlet).** Following upland cleanup and containment, sediment remediation was performed at the site under Ecology's Model Toxics Control Act (MTCA). Sediment dredging was completed in early 2002 with 40,000 cy of contaminated material being disposed of at an adjacent upland confined disposal facility.
- **Commencement Bay** – Hylebos Wood Debris. Wood debris has been removed from the Louisiana Pacific (5,000 cy) and Weyerhaeuser (18,000 cy) sites. Wood debris removal is currently under way at the Manke site with a total of 100,000 cy of material targeted for removal. Most of the wood debris removal at the Manke site should be completed by Winter of 2003.
- **Puget Sound Naval Shipyard.** The effects from filling of a submerged aquatic disposal pit on Navy property with contaminated sediments from the site continue to be studied and will be considered in a long term monitoring plan. The condition of adjacent state-managed lands remains an issue and is being worked out with DNR.
- **Jackson Park Housing Complex (Ostrich Bay).** Last year Ecology issued an enforcement order for the site which requires a cleanup action plan for the marine operable unit. That plan is due this month.
- **Spokane River Basin.** Remediation of shoreline sites is expected in the near future. Ecology has started taking remedial action for PCB contamination at the Upriver Dam site.
- **Lake Washington.**
  - Barbee Mill – Massive amounts of submerged wood debris has been removed with the help of USACE.
  - J.H. Baxter – Cleanup was completed in October 2002 by removal of contaminated sediments and restoration of wetland habitat

- Quendall Terminals Site – Cleanup action plan is currently being developed

- **Skykomish River.** Subsurface soils containing petroleum to 15 feet below ground surface are impacting the groundwater and sediments. The Burlington Northern/Santa Fe Railroad is currently under agreed order to clean up this site and the draft RI/FS is due out this week

Ms. Carlin then provided the following web site addresses:

- SEDQUAL data entry templates – http://www.ecy.wa.gov/programs/tcp/smu/sedqual/sedqualtemplates.htm
- PSEP protocols – http://www.wa.gov/puget_sound/Publications/protocols/protocol.html
- DMMP SAP example – http://www.nws.usace.army.mil/PublicMenu/Menu.cfm?sitename=dmmo&pagename=Useful_Stuff
- SW-846 methods – http://www.epa.gov/epaoswer/hazwaste/test/sw846.htm

Question: Dr. Joe Germano, Germano and Associates, asked where the wood debris that was removed from the Hylebos was disposed of.

Response: Mr. Russ McMillan, Ecology, responded that a lot of the material removed this year was actually determined to be PSDDA suitable and was disposed of at the PSDDA disposal site in Commencement Bay.

Clarification: Mr. John Malek, EPA, clarified that the material removed was classified as predominantly sediment.

Question: Mr. Eric Johnson, Washington Public Ports Association, notes the mention of TMDLs for sediments in the lower Duwamish being developed. He noted that TMDLs are primarily designed for NPDES discharges and asked if those TMDLs would be developed strictly for contaminants that are part of an existing NPDES permitted discharge, based on a listing of historic sediment contamination rather than on permitted discharges.

Response: Ms. Carlin replied that Ecology is currently taking that into consideration, but that they have not decided how they will approach the issue for the Lower Duwamish. They have been discussing the same concerns that Mr. Johnson raised and Ecology

source control staff will be meeting to develop an approach. Ms. Carlin emphasized that the process will be a challenging one.

Slides

PP 4.1 Sediment Management Standards
PP 4.2 Chapter 173-204-120 WAC Antidegradation Policy
PP 4.3 Freshwater Sediment Guidelines, SEDQUAL Benthic Infauna Analysis Tool, Sediment Quality Spatial Monitoring
PP 4.4 Sediment Sampling and Analysis Plan Appendix (SAPA)
PP 4.5 Sediment Source Control
PP 4.6 some…Sediment Site Status
PP 4.7 Bellingham Bay Demonstration Pilot Remedial Activities
PP 4.8 Whatcom Waterway
PP 4.9 Lower Duwamish Waterway Source Control
PP 4.10 Cascade Pole, Olympia
PP 4.11 Hylebos Wood Debris
PP 4.12 Puget Sound Naval Shipyard and Jackson Park Housing Complex
PP 4.13 Spokane River Basin
PP 4.14 Upriver Dam Site
PP 4.15 Lake Washington
PP 4.16 Skykomish River
PP 4.17 More Web Sites…
PP 4.18 Sediment Management Standards

5. EPA Summary of Regional Activities (Lori Cohen, EPA Region 10). Ms. Cohen mentioned the incredible national debate going on with respect to the effectiveness of the Superfund program at cleaning up mega-sites, in particular sediment and mining sites. Ms. Cohen mentioned that she would be focusing on sediment cleanup sites the EPA has recently been involved in. In Region 10, they have been working very hard to include habitat enhancement in their sediment cleanup activities/projects.

Ms. Cohen provided a brief overview of the following cleanup activities that EPA has recently been involved in:

- Olympic View Resource Area
- Hylebos Waterway
- Occidental 5106 Area
- Thea Foss/Wheeler Osgood Waterways

Ms. Cohen mentioned a major milestone that has been met with respect to Commencement Bay. As of March 2003, Ecology in conjunction with EPA (primarily Ecology), after more than 10 years of investigating and inspecting contaminant sources in Commencement Bay, has completed all Commencement Bay source control work required under Superfund. All major known sources of contamination to Commencement Bay have been identified and are under orders or permits. Ms. Cohen emphasized the significance of this work, in that it means sediment cleanup can proceed.

The generalized timeline and construction sequence of the Commencement Bay cleanup projects was provided. Ms. Cohen noted a correction to the slide depicting the construction sequence as follows: The major dredging work for the head of the Hylebos Waterway will take place in 2004, not 2003 as indicated.

Ms. Cohen then mentioned the following cleanup projects planned for 2003/2004:

- Pacific Sound Resources Site (Seattle) – This is the former Wycoff facility located in West Seattle. Five hundred pilings are scheduled to be removed this summer and a 50-acre cap will be placed adjacent to the old Wycoff facility. This will complete the cleanup efforts for this site (the uplands were cleaned up several years ago under Superfund).
- Todd Shipyard Cleanup (Harbor Island) – Negotiations are in their final phase and the Consent Decree will be available for public comment soon. This project will involve removal of 2,300 pilings, removal of 200,000 cy of sediment, and capping under piers where dredging isn't possible.
- Lockheed Shipyard Cleanup (Harbor Island) – Negotiations are in their final phase and the Consent Decree will be available for public comment soon. This project will involve removal of a major pier and 6,000 pilings, removal of 130,000 cy of sediment, and capping of 4 acres.

Ms. Cohen mentioned that there are other Superfund sediment projects that EPA is involved in that weren't mentioned, including the Duwamish Waterway (which Alison Hiltner would be covering later on) and the Portland Harbor project. Ms. Cohen provided handouts summarizing EPA's Region 10 Superfund projects. Individuals that would like an electronic copy of the handout can email Ms. Cohen at cohen.lori@epa.gov.

There were no questions.

Slides

PP 5.1 EPA Region 10 Superfund Sediment Cleanup

PP 5.2 Cleanup Work Fall 2002/Winter 2003
PP 5.3 Olympic View Resource Area (Dioxins, Metals, PCBs)
PP 5.4 Olympic View Resource Area During Site Excavation
PP 5.5 Olympic View Resource Area After Cleanup
PP 5.6 Hylebos – 2002 Actions
PP 5.7 Area 5106 Removal Action at Occidental Chemical Site
PP 5.8 Toyo Submersible Dredge Pump (Submerged)
PP 5.9 Toyo Submersible Dredge Pump
PP 5.10 Toyo Submersible Dredge Pump cont.
PP 5.11 Area 5106 Treatment Plant
PP 5.12 Storage of Area 5106 Treated Sediment Prior to Disposal into Slip 1
PP 5.13 Thea Foss & Wheeler-Osgood 2002 Actions
PP 5.14 North Shore Thea Foss Waterway Prior to Bank Cleanup
PP 5.15 North Shore Thea Foss Waterway Prior to Bank Cleanup cont.
PP 5.16 North Shore Thea Foss Waterway After Bank Cleanup
PP 5.17 South Shore Thea Foss Waterway Prior to Bank Cleanup
PP 5.18 South Shore Thea Foss Waterway After Bank Cleanup
PP 5.19 Sheetpile Wall Installed Along Johnnie's Seafood
PP 5.20 Commencement Bay
PP 5.21 Commencement Bay Nearshore/Tideflats Generalized Timeline
PP 5.22 Commencement Bay Nearshore/Tideflats General Construction Sequencing
PP 5.23 Cleanup Work Planned for 2003/2004

6. Summary Overview of Clarification Papers (Lauran Cole Warner, USACE-DMMO). Ms. Warner provided a brief summary of the three clarification papers submitted as follows:

- **Pre-dredge Conferences for Projects in Grays Harbor and Willapa Bay** – Unlike other regulated projects evaluated under the DMMP program, pre-dredge conferences have not been required for Grays Harbor/Willapa Bay projects. Ms. Warner mentioned that this system has not been working for various reasons. Problems have arisen due to lack of communication regarding site issues and concerns. In particular with respect to Endangered Species Act (ESA) issues relating to bull trout, coordination of material for beneficial uses, and Dungeness crab. Ms. Warner stated that the bottom line is that pre-dredge conferences are effective and necessary and will be required for future dredging projects in Grays Harbor and Willapa Bay. Ms. Warner emphasized that the pre-dredge meetings can take place over the phone if that is more convenient for the project team.
- **Recency Guideline Exceedances: Guidelines for Retesting in High Ranked Areas** – In 2002 a clarification paper was submitted highlightine recency guidelines for high ranked areas, where a 2-year time limit exceedance for sediment quality data, would

necessitate some re-testing. A number of projects during the past year had recency exceedances and triggered retesting, and this triggered the realization that furtherclarification was necessary. In particular it was necessary to provide additional guidance with respect to sampling design. (e.g., Should testing re-create previous samples collected or take existing information and fine tune the sample locations and representative volumes?). To illustrate this issue, Ms. Warner summarized the results from three projects (Terminal 18 Stage 1A, East Waterway Stage 2, and U.S. Coast Guard's Pier 36) within Seattle's East Waterway that required re-testing due to recency exceedances. Retesting strategies for these projects included pooling of smaller DMMUs into a larger DMMU composite, archiving of all samples, and relocation of samples based on existing data and newly acquired information. Results of the retesting efforts validated the need for retesting. Proposed clarification to the recency guidelines were then summarized (PP 6.15).

- **Updated Open Water Disposal Site Use Authorization Language** – DNR will provide an update later on in the meeting.

Ms. Warner closed by providing the website address where individuals could view and download papers: http://www.nws.usace.army.mil. Click on "Dredge Material Management" and follow the links to "Annual Review Meeting."

There were no questions.

Slides

PP 6.1 Summary Overview of Clarification Papers
PP 6.2 Good Morning
PP 6.3 2003 Clarification Papers
PP 6.4 Pre-dredge Conferences for Projects in Grays Harbor and Willapa Bay
PP 6.5 Pre-dredge Conferences for Projects in Grays Harbor and Willapa Bay – Existing Language
PP 6.6 Pre-dredge Conferences for Projects in Grays Harbor and Willapa Bay – Issues
PP 6.7 Washaway Beach in Willapa Bay
PP 6.8 Pre-Dredge Conferences for Projects in Grays Harbor and Willapa Bay – Clarification
PP 6.9 Untitled Photo
PP 6.10 Recency Guideline Exceedances: Guidelines for Retesting in High Ranked Areas
PP 6.11 Recency Guideline Exceedances: Guidelines for Retesting in High Ranked Areas cont.

PP 6.12 Recency Guideline Exceedances: Guidelines for Retesting in High Ranked Areas cont.
PP 6.13 Recency Guideline Exceedances: Guidelines for Retesting in High Ranked Areas cont.
PP 6.14 Recency Guideline Exceedances: Guidelines for Retesting in High Ranked Areas cont.
PP 6.15 Recency Guideline Exceedances: Guidelines for Retesting in High Ranked Areas – Proposed Clarification
PP 6.16 To view and download papers
PP 6.17 Questions?
PP 6.18 Untitled Photo

7. New Site Use Authorization Language and Disposal Site Fee Increase (Loren Stern, Aquatic Resources Division Manager, DNR). Mr. Stern pointed out that DNR is proposing to update the site use authorization language. Mr. Stern said that they are toward the end of the process in getting the language finalized through the stakeholders. DNR is accepting comments on the proposed new language up until May 20, 2003. Comments may be sent to Peter Leon at his DNR address or emailed directly to Peter at peter.leon@wadnr.gov.

Question: Mr. Eric Johnson, Washington Public Ports Association asked if they were confident that the issue was whether or not the insurance and bonding requirements being proposed by DNR for the site use authorization for Simpson was going to be available on the commercial market for the dredger themselves. For the Simpson project, the bonding house has told us that they won't bond a dredger for the misbehavior of a contractor, that kind of coverage just isn't available. He wondered if the product/coverage is available on the commercial market, because if it's not, all the work could be undone by insurance issues.

Response: Mr. Stern responded that, in response to other insurance questions, he has discovered that after September 11th, the insurance market is changing almost daily. Requests made one week might not be available the next. Mr. Stern then asked if Peter or Robert of DNR had anything to add to that.

Response: Mr. Peter Leon, DNR, stated that he would have to get back to Eric with a specific answer. He had been talking with the agency's risk manager about that same issue and his understanding is that he didn't see it has a big issue.

Response: Mr. Stern followed up with an example from the Geoduck scenario, in which protection and indemnification insurance at $1,000,000 was tough to get but could be

obtained at the $300,000 level. He noted that we have to follow changes on a daily basis and be adaptive as we move through the dredging season.

Comment: Mr. Eric Johnson, Washington Public Ports Association, stated that the difference between the Geoduck contractor and the dredger is that, in the case of the Geoduck, the legal forms that you are filling out are directly between you and the Geoduck contractor.

Response: Mr. Stern responded that the situation is very similar in that the contracts are with those that purchase quotas from DNR and they hire harvesters to do the work.

Comment: Mr. Eric Johnson, Washington Public Ports Association, stated that the issue was whether or not financial responsibility can be proven by the site use authorization recipient on behalf of a contractor. It has to do with the hand off of liability and financial responsibility between the Port (in the case of a Port) and Manson Construction. The issue becomes not so much whether Manson has insurance and the Port has insurance, it's whose insurance is on the book. At that point it gets very complicated from the insurance end, because the insurance company will say "We're going to insure YOU but we're not going to insure you for somebody else."

Question: Mr. Dick Gilmur, Port of Tacoma, stated that it has been indicated that DNR is accepting comments up until the 20th of this month, and asked that Mr. Stern explain what the rest of the process involves so that we can understand how DNR will be dealing with those comments, how they will address the comments, and whether there will be an opportunity for discussion if issues come up.

Response: Mr. Stern stated that DNR's process for dealing with comments will be a wide open process where the comments will be received, reviewed, and incorporated, if possible. If they can't incorporate a comment, they will contact the author and let them know why. Should an individual have a different opinion regarding whether a comment should be included, Mr. Stern indicated that the process would then involve direct discussions between himself and the individual.

Mr. Stern then discussed disposal site fee increases. Mr. Stern mentioned that last fall he was notified that the dredged material management (DMM) account would go negative during fiscal year 2006 unless some changes were made. DNR has requested legislative authority to increase spending out of the DMM account. This would allow DNR to initiate the rule-making process, so that they can work with the public to determine what the new fee should

be. Mr. Stern then showed the current governing statutes and rules, and provided the current language addressing disposal site fees.

Mr. Stern provided a brief overview of the history of disposal and monitoring fees from 1988 thru 2002. Monitoring costs have tripled since 1988. DNR has dealt with this by increasing the monitoring trigger volume, so that they are not monitoring the disposal sites as often. However, DNR has limited ability to increase monitoring trigger volumes much more than they currently are. Mr. Stern presented average upland landfill tipping fees and presented DNR's proposed disposal fee increase necessary to cover the average costs for monitoring disposal sites (including costs associated with additional BCOC analyses).

Mr. Stern presented the average trigger volumes for each open water disposal site and stressed that these are soft trigger volumes. Mr. Stern further explained that when the trigger volume has been reached at a site, it doesn't mean that disposal would stop. Disposal would continue until completed, and monitoring would be initiated at that point. Mr. Stern then presented what the required disposal fee increase would be ($0.65 per cy) based on the average disposal site monitoring costs and the average trigger volume.

A brief overview of management costs and subsequent benefits was presented, noting that DNR has invested money in special studies, additional staff positions to help with monitoring efforts, and renewal of their shoreline management permits.

Mr. Stern stated that DNR has been able to keep costs down by increasing their disposal site trigger monitoring volumes and by coordinating beneficial use opportunities (where DNR has a lot more work to do). Mr. Stern then discussed what the results would be if they did not get approval for the disposal fee increase, and showed a comparison of costs associated with open ocean disposal versus DMMP site disposal. The bottom line is that DMMP site disposal is less expensive across the board for Washington State.

Mr. Stern closed by discussing the sequence of events that will be taking place including initiation of the rule-making process should be budget be passed by the State Legislature.

Question: Mr. Dick Gilmur, Port of Tacoma, asked how long DNR expects the process that was laid out for the rule change to take effect.

Response: Mr. Stern responded that they briefly scoped it out and that they want to move forward as quickly as possible. One of the things that they have looked at is that DNR does not meet in August. The most aggressive time-period would be to try to get the proposal to the Board of Natural Resources in July. Mr. Stern is skeptical that they

will be able to meet that timeframe. Mr. Stern stressed again that they do want to move quickly as, under the current assumptions, their account goes into the red sometime in fiscal year 2006. Robert Brenner identified this to them last fall, projecting a positive balance in the account of approximately$240,000 by the end of this fiscal year. Mr. Stern thinks that the situation is a little bit better than that and that they actually will have an additional $230,000 to $240,000 at the end of this fiscal year. Mr. Stern stressed that this process is not something that they want to wait on. They would like to get the change in place and stressed that DNR did not manage the account to make money, but that the money in the account is strictly used to manage the disposal program. Mr. Stern stated that the public has a commitment from the Commissioner and himself that the rule-making process will be an open one and that the public will have plenty of opportunity to provide their comments.

Question: Mr. Dick Gilmur, Port of Tacoma, asked whether DNR would go back and retroactively modify use authorizations in place to the new fee, or just apply the new fee to future use authorizations.

Response: Mr. Stern stated that he would probably instigate an internal discussion to address that issue and felt that, although it was unlikely to be modified retroactively, they would have an internal discussion regarding what they have in the account and what site use authorization legally allows. Mr. Stern stated that a deal is a deal when both parties have signed on the bottom line and that DNR typically would not move backwards.

Comment: Mr. Eric Johnson, Washington Public Ports Association, commented that the numbers Mr. Stern used expressing what a great deal this is are a little bit misleading, in that disposal costs that he cited for sediment landfills are based on contaminated soil and not clean soils. Soils that pass the PSDDA screening are probably not going to go to a contaminated landfill, so he didn't necessarily agree with Mr. Stern's assessment.

Response: Mr. Stern thanked Mr. Johnson for his comment.

Comment/Question: Mr. Eric Johnson, Washington Public Ports Association, commented that DNR is the only agency getting its staff fees paid out of this account. At the time that PSDDA was set up, this fee was designed to cover the monitoring and management of the sites only. Mr. Johnson's impression at the time was that the fee was just covering monitoring of sites and didn't involve agency staff fees. Over the years, DNR has essentially "gotten by." It was the department's decision to pay for its own staff costs, so you have to remember that that fee pays for more than just the monitoring of the sites and that it includes department administrative costs for the management of

those sites. Mr. Johnson noticed that a big piece of the fee increase is driven by the additional analysis of BCOCs. Meanwhile one of the issue papers being presented today proposes the addition of more BCOCs to the list and Mr. Johnson wondered how we will pay for those additional analyses.

Response: Ms. Erika Hoffman, EPA, responded that Eric brought up a very reasonable point and asked that the question be deferred until the end of her discussion on BCOCs, as she will be addressing that topic in particular.

Question: Mr. Ted Benson, Ecology, asked how amenable DNR would be to use of alternative disposal sites.

Response: Mr. Stern did not know.

Slides

PP 7.1 Proposed Fee Increase for Open Water Dredged Material Disposal Site Use
PP 7.2 Purpose
PP 7.3 Governing Statutes and Rules
PP 7.4 Governing Statutes and Rules cont.
PP 7.5 History
PP 7.6 History cont.
PP 7.7 Facts
PP 7.8 Facts cont.
PP 7.9 Facts cont.
PP 7.10 Average Trigger Volume
PP 7.11 Required Fee: Average Calculation
PP 7.12 Management Costs & Benefits
PP 7.13 How are costs kept down?
PP 7.14 Results of No Fee Increase
PP 7.15 Results of No Fee Increase cont.
PP 7.16 What happens next?

8. Final Revisions to the DMMP's Bioaccumulative Contaminant of Concern List
(Erika Hoffman, EPA Region 10). Ms. Hoffman clarified that she will be discussing the final version of the BCOC list and will describe the implementation process the DMMP envisions involving the analysis of BCOCs in upcoming projects. Ms. Hoffman reminded everyone that when she refers to BCOCs that they are a subset of the DMMP contaminants of concern list. This is a subset of contaminants that are toxic via uptake and accumulation in tissues.

Ms. Hoffman briefly described the reasons why the BCOC list was revised, the revision process itself, and provided an overview of issues raised during review of the draft BCOC lists.

Ms. Hoffman then went on to summarize the changes to each of the four lists as follows:

- **List 1: Primary BCOCs.** This is the list of BCOCs that the DMMP will be requiring analysis of for all dredging projects. Changes to the list were discussed and how they might impact sediment and tissue analyses and bioaccumulation testing. Ms. Hoffman stressed that the interim sediment bioaccumulation trigger values (BTs) derived are heavily qualified, in that they are not bioaccumulation-based numbers. They are numbers that are based on PSDDA screening levels (SLs) or maximum levels (MLs), or either low AETs or high AETs. The DMMP recognizes that they need to come up with a more robust process for coming up with bioaccumulation-based BTs, and will do so as soon as possible.
- **List 2: Candidate BCOCs.** This is the list of BCOCs that have been identified as toxic and bioaccumulative, but without enough regional data to support their presence in List 1. The Elliott Bay disposal site monitoring effort of 2002 included the analysis of List 2 BCOCs, and no List 2 chemicals were detected in either sediments or tissues. However, this is a clean disposal site, and Ms. Hoffman indicated that it would be very useful information if future contaminated sediment monitoring projects were to include this list in their analyses. Ms. Hoffman added that, in reference to Mr. Stern's talk and Mr. Johnson's question, the analysis costs for the Elliott Bay monitoring effort were quite a bit higher than what would be normally associated with BCOC testing. This was due to additional costs associated with the lab performing isotope dilution and additional clean-up on the samples, which would not normally be required. Based on a survey of the commercial laboratories, Ms. Hoffman found that inclusion of the final List 2 BCOCs (which are not typically required for disposal site monitoring) would not result in a significant cost increase. Ms. Hoffman wondered if the DNR's analysis might have included those one-time only initial costs and suggested that DNR look into that.
- **List 3: Potentially Bioaccumulative.** This list is the holding place for BCOCs that don't have enough supporting data to warrant their addition to Lists 1 or 2.
- **List 4: No Further Consideration.** This list represents chemicals where there is enough information available to confirm that we shouldn't be worrying about them too much in terms of bioaccumulation. This list consists of compounds from the previous BCOC list with low octonol-water partitioning coefficients (log Kows<3.5). Ms. Hoffman noted that low Kows don't necessarily mean a contaminant will not bioaccumulate or bioconcentrate in tissues and that there are plenty of examples

where these types of compounds do have higher accumulation rates in tissues. Ms. Hoffman stated that the DMMP would be happy to evaluate these compounds in the future if there are concerns.

Ms. Hoffman then summarized the implementation of the BCOCs into the program, stressing that for the present time, target tissue levels (TTLs) will be developed on a project specific basis. Ms. Hoffman closed by describing the next steps in implementing the list and future actions/issues that will be evaluated by the Bioaccumulation Work Group (BWG).

Question: Ms. Shannon Dunn, Landau Assoc., asked whether additional costs associated with running bioassays due to a BT exceedance were factored into Ms. Hoffman's analysis.

Response: Ms. Hoffman replied that she didn't look specifically at the bioassay costs. What Ms. Hoffman found in her analysis was that it didn't look like there would be significant increases in BT exceedances with the addition of the List 1 chemicals, and subsequently there wouldn't be significant costs associated with tissue or bioassay analyses as a result of that.

Question: Ms. Jennifer Sutter, Oregon DEQ, asked Ms. Hoffman why she stated that she felt better about the BTs developed for selenium than the other BTs.

Response: Ms. Hoffman replied that it wasn't that she felt so much better about the selenium BT, but more that she felt so bad about the other trace metals. Ms. Hoffman emphasized that they really needed to use a more robust and specific process to develop the BTs.

Question: Ms. Jennifer Sutter, asked if dieldrin was taken off the list because of the detection issue.

Response: Ms. Hoffman replied that she had that file with her, and rather than guess at an answer, she would like to take a look at it and would get back to her.

Slides

PP 8.1 Final Revisions to the DMMP's Bioaccumulative Contaminant of Concern List
PP 8.2 Why revise the list?
PP 8.3 The Revision Process
PP 8.4 Issues Raised: Draft Lists

PP 8.5 List 1: Primary BCOCs
PP 8.6 List 1: Primary BCOCs cont.
PP 8.7 List 1: Primary BCOCs – Implications for sediment analysis
PP 8.8 List 1: Primary BCOCs – Implications for tissue analysis
PP 8.9 List 1: Primary BCOCs – Implications for bioaccumulation testing
PP 8.10 Frequency of BT Exceedances: >10 from former BCOC List
PP 8.11 Frequency of BT Exceedances: >10 from revised BCOC List
PP 8.12 Number of sediments needing bioaccumulation testing
PP 8.13 List 2: Candidate BCOCs
PP 8.14 List 2: Candidate BCOCs – Results of 2002 Elliott Bay Disposal Monitoring
PP 8.15 List 3: Potentially Bioaccumulative
PP 8.16 List 4: No Further Consideration
PP 8.17 Implementation
PP 8.18 Next Steps

9. Sediment Quality Information System (SEDQUAL) Update (Martin Payne, Ecology). Mr. Payne announced the release of SEDQUAL version 5 and shared some of the updates to the program. Mr. Payne then thanked the various experts that participated and assisted in the update.

Mr. Payne went on to describe the following new and improved analysis features of SEDQUAL release 5 including improved bioassay and chemistry hit interpretation, station annotation, improved taxonomic identification, and improved sample group filters (PP 9.3 thru 9.9).

Mr. Payne concluded by summarizing how analysis results are to be reported in SEDQUAL.

Question: Mr. Tad Deschler, Windward Environmental, asked if there were procedures in place to document the quality of the data going into SEDQUAL.

Response: Mr. Payne responded that there are procedures already well established and in place to document the quality of the data going into SEDQUAL. It was more a matter of the data submittals containing the information necessary to determine the quality assurance level associated with the data as well as determining the quality assurance level (whether it be level QA1 or QA2) that the user needs for their queries.

Comment: Dr. Michelsen also emphasized that, in her SEDQUAL queries, she noticed that it was not common to have the quality assurance level of a data set identified and that

this should be clarified and filled out appropriately prior to submitting the data to Ecology for entry into the SEDQUAL database.

Clarification: Mr. Gries clarified that the user should always look at the QA fields when performing queries in SEDQUAL so that they know the quality of the data they are obtaining from the database. He stressed that the "buyer beware" and the user should always have a clear idea of objectives when using data from SEDQUAL.

Slides

PP 9.1 Sediment Quality Information System SEDQUAL – Release 5
PP 9.2 Sediment Quality Information System SEDQUAL – Release 5 cont.
PP 9.3 Sediment Quality Information System SEDQUAL – Release 5 cont.
PP 9.4 Station Annotations
PP 9.5 Station Annotations cont.
PP 9.6 Improved taxonomic identification
PP 9.7 Improved sample group filters
PP 9.8 Benthic Hit Interpretation
PP 9.9 Benthic Infauna Comparisons
PP 9.10 How are analysis results reported?

10. Use of Interpolation Methods for Characterizing Distribution of Sediment Chemical Contamination, Area-Weighted Averaging, and Mass and Volume Calculations (Maureen Goff, SAIC for Ecology). Ms. Goff presented an Ecology case study using two different methods for characterizing the distribution of sediment chemical contamination. Ms. Goff mentioned that Thiessen polygons were a common tool used to describe these distributions and proposed that other spatial interpolation methods (i.e., Inverse-Distance Weighting, Natural Neighbor, Kriging, etc.), which are based on "best available science," be used instead. Ms. Goff then went on to provide the results of the Ecology case study in which a data set was evaluated using Thiessen Polygons and Inverse Distance Weighting (IDW).

Ms. Goff explained that Thiessen Polygons are used to assign concentration values to the areas between sampling points. The problem is that Thiessen, or other randomly assigned polygons, assume that neighboring sample point concentrations are independent of one another, which is not the case with most environmental data.

Ms. Goff stated that other interpolation methods, such as IDW, are more appropriate for environmental data because they take advantage of the spatial correlation of data points (e.g., as the distance between data points increases, their relationship or influence they have on one another decreases). Ms. Goff then provided various comparisons of Thiessen Polygon versus IDW spatial distribution patterns and emphasized the technical advantages of IDW and Thiessen Polygons (PP 10.10 through 10.14).

Ms. Goff then presented a comparison of the estimation error obtained using both methods with the IDW method consistently resulting in a lower error estimate over that obtained using Thiessen Polygons (PP 10.16 through 10.19).

Ms. Goff concluded by stating that Ecology considers the "best available science" for characterizing sediment chemical contamination to be interpolation methods that respect the spatial correlation of environmental data and utilize the tools that provide the greatest accuracy, thereby improving area-weighted averaging and volume estimates. In addition, they also provide the technical advantages of working with newly developed automated tools designed specifically for sediment characterization.

> ***Question:*** Mr. Tad Deschler, Windward Environmental, was curious about the error analysis that Ms. Goff performed.
>
> ***Response:*** Ms. Goff responded that there are built-in tools for error analysis. The estimation error analysis that she performed was based on a random sample design (how

she split the data set into initial versus secondary sampling event). To ground truth something, such as a surface that was created from IDW or polygons, the only way to verify it would be to go out and collect more samples. Ms. Goff simply simulated that by using the secondary data set to simulate additional samples collected.

Question: Mr. Tad Deschler, Windward Environmental, speculated that if you did that a bunch of times you would get a range of errors.

Response: Ms. Goff responded that that was correct.

Slides

PP 10.1 Use of Interpolation Methods for Characterizing Distribution of Sediment Chemical Contamination, Area-Weighted Averaging, and Mass and Volume Calculations
PP 10.2 Introduction
PP 10.3 Purpose
PP 10.4 Estimating Areas and Concentrations
PP 10.5 Thiessen Polygons
PP 10.6 Inverse Distance Weighting (IDW)
PP 10.7 Spatial Correlation
PP 10.8 Spatial Correlation cont.
PP 10.9 Interpolated Values
PP 10.10 Technical Advantages
PP 10.11 Technical Advantages – Mass and Volume Calculations
PP 10.12 Technical Advantages – Identify cells where multiple conditions exist
PP 10.13 Technical Advantages – Identify changes over time
PP 10.14 Technical Advantages – Calculating Area-weighted Averages
PP 10.15 Comparing Methods
PP 10.16 Comparing Estimation Error
PP 10.17 Comparing Estimation Error cont.
PP 10.18 Comparing Estimation Error cont.
PP 10.19 Improved Estimation Error
PP 10.20 Summary
PP 10.21 References

11. Freshwater Sediment Quality Guidelines for Washington State (Dr.Teresa Michelsen, Avocet Consulting for Ecology). Dr. Michelsen started off by acknowledging the participants involved in the development of the freshwater sediment quality guidelines. Dr.

Michelsen explained that there are two phases to the project, with Phase I having been completed already (with copies available through Brett Betts) and Phase II, which is scheduled for release this July. Dr. Michelsen briefly went over the work completed for Phase I, including the sediment quality value (SQV) evaluation, reliability assessment, and recommendations for use (PP 11.3 through 11.9).

Dr. Michelsen then went on to summarize the activities associated with Phase II including updates to SEDQUAL, recalculation of freshwater AETs, calculation of alternative guidelines, and reliability assessment evaluation. Phase II status and results were summarized (PP 11.11 and 11.12). Dr. Michelsen closed by providing a summary of the toxicity drivers for the freshwater SQVs, emphasizing that the sum of PAHs and PCBs were better toxicity drivers than the individual PAHs or Aroclors. Dr. Michelsen mentioned that they couldn't calculate SQVs for DDT and many other pesticides due to a lack of data available. Dr. Michelsen anticipates the draft report for Phase II to be out in July.

Question: Mr. Colin Elliott, King County Environmental Laboratory, asked Ms. Michelsen if she had evaluated criteria for choosing freshwater reference sites for bioassays.

Response: Dr. Michelsen responded that they used the reference sites chosen by the authors of the study. There has been some work in the Willammette River and Columbia River basin and stated that she wasn't sure who sponsored it, but they are currently looking for that data and will continue to look for potential candidates for good reference sites.

Question: Ms. Kathy Godtfredsen, Windward Environmental, asked Dr. Michelsen why total PCBs was one of the drivers for freshwater criteria values.

Response: Dr. Michelsen responded that when individual Aroclors were evaluated there was no effect observed, but when you looked at the total PCBs versus impacts there was a definite impact.

Question: Mr. John Hicks, Shaw Environmental, asked whether Ms. Michelsen had looked at PCB congener data at all.

Response: Dr. Michelsen responded that they didn't have enough congener data to include in their evaluation.

Slides

PP 11.1 Freshwater Sediment Quality Guidelines for Washington State
PP 11.2 Participants
PP 11.3 Phase I – 2002
PP 11.4 SQV Evaluation
PP 11.5 Evaluation Criteria
PP 11.6 Reliability Assessment
PP 11.7 Reliability Assessment Results
PP 11.8 Recommendations for Use
PP 11.9 Other Phase I Results
PP 11.10 Phase II Activities
PP 11.11 Phase II Status
PP 11.12 Draft Phase II Results
PP 11.13 Toxicity Drivers

12. Electrochemical Remediation Technologies Treating Mercury and Organic Contaminants in Puget Sound Marine Sediments (Brad Helland, Ecology). Mr. Helland presented preliminary data from the electrochemical remediation technologies (ECRT) pilot test for the treatment of mercury and PAH contaminated sediments conducted in the Georgia Pacific Log Pond in Bellingham, Washington. Mr. Helland provided an overview of the project basis, the location of the pilot project, and a plan view of the electrode placement on-site (PP 12.6 through 12.6).

Mr. Helland explained that ECRT technology, when applied to sediments is theoretical at best, and is based on induced redox reactions where organic constituents are broken down via an electrochemical geo-oxidation process and metals are mobilized (thus limiting the volume of sediment to be removed) via an induced complexation process. Mr. Helland mentioned that numerous ECRT studies have been conducted on contaminated upland sites throughout Europe and the United States; however, this is the first pilot test conducted on a contaminated marine sediment site in the U.S. Mr. Helland then went on to explain the theory behind ECRT (PP 12.8 through 12.11) and described the installation of the electrodes on-site (PP 12.12 and 12.13).

There were five sampling events associated with the pilot test; pre-demonstration, baseline, one month after electrode placement, two months after electrode placement, and after electrode removal. Results were presented for the first three events. (Data were not yet available for samples collected after electrode removal) (PP 12.15 and 12.16). Mr. Helland stated that, based on the limited data available, there's not a lot of remediation occurring between T4 and T10 with T7 being a possible exception. T1 and T2 did show potentially

significant decreases in mercury concentrations. Mr. Helland stressed that conclusions are difficult to draw at this point as it is a comparison between 2 data points. Additional archived samples are being analyzed, however data were not available for inclusion in this presentation.

Mr. Helland then described the removal process for the electrodes. The electrodes were to be submitted for analysis. The main issue with the electrodes was corrosion at the contact points, so efficacy of program is difficult to assess.

Mr. Helland closed by summarizing the pilot test results and the project status (PP 12.19 and 12.20).

There were no questions.

Slides

PP 12.1 Pilot Test – Electrochemical Remediation Technologies Treating Mercury and Organic Contaminants in Puget Sound Marine Sediments
PP 12.2 Project Team
PP 12.3 Project Basis
PP 12.4 Puget Sound In Situ Demo
PP 12.5 Puget Sound In Situ Demo cont.
PP 12.6 Puget Sound In Situ Demo cont.
PP 12.7 ECRTs Basis
PP 12.8 Process Flow – Electricity
PP 12.9 Induced Redox Reactions
PP 12.10 ECRTs Pore Scale Redox Model
PP 12.11 Electrical Energy Input
PP 12.12 Installation
PP 12.13 Installation cont.
PP 12.14 ECRT Demonstration Sediment Sampling Locations
PP 12.15 In-progress Results
PP 12.16 Hg Concentrations
PP 12.17 Removal
PP 12.18 Removal cont.
PP 12.19 Discussion
PP 12.20 Project Status

13. "Dredged Material" – A Clarification (Tom Gries, Ecology). Mr. Gries provided clarification on determining when material above mean/ordinary high water will be characterized under the DMMP. In clarifying the definition of "dredged material," Mr. Gries reviewed the definitions for dredged material from the Clean Water Act, USACE/EPA Green Book, PSDDA Evaluation Procedures Technical Appendix (EPTA), and other sources. Mr. Gries noted that most of the above-mentioned documents define dredged material as that which is excavated from waterways of the U.S. or from the bottom of a water body or channel. However, EPTA defines dredged material a bit differently and allows for material beyond the angle of repose to be handled as dredged material under special circumstances (PP 13.4 and 13.5).

Mr. Gries mentioned that the reason this clarification has become necessary, is that some recent Port expansion and other projects have argued that large bank cutback material (beyond the angle of repose) could be handled as dredged material for several reasons pointed out in PP 13.7. Mr. Gries then brought up a recent project that was evaluated by the DMMP. (Note: more detailed discussion of the project and issue are provided in the clarification paper submitted.) In the process of the DMMP evaluating the dredging plans for this project, several questions came up with respect to what constituted dredged material and how it should be defined (PP 13.8).

Mr. Gries then provided the proposed clarification for the definition of dredged material (PP 13.9 through 13.12), and stressed that if the project team believes their project will involve removal of material beyond the angle of repose, that should be brought up to the DMMP as early in the process as possible (ideally during the pre-application meeting).

There were no questions.

Slides

PP 13.1 "Dredged Material" – A Clarification (Outline)
PP 13.2 "Dredged Material" – A Clarification (Background)
PP 13.3 "Dredged Material" – A Clarification (Background cont.)
PP 13.4 "Dredged Material" – A Clarification (Background: EPTA dredging prism)
PP 13.5 "Dredged Material" – A Clarification (Background cont.)
PP 13.6 "Dredged Material" – A Clarification (Problem Identification)
PP 13.7 "Dredged Material" – A Clarification (Problem Identification cont.)
PP 13.8 "Dredged Material" – A Clarification (Problem Identification cont.)
PP 13.9 "Dredged Material" – A Clarification (Proposed Clarification)

PP 13.10 "Dredged Material" – A Clarification (Background: EPTA dredging prism cross-section)
PP 13.11 "Dredged Material" – A Clarification (Proposed Clarification cont.)
PP 13.12 "Dredged Material" – A Clarification (Proposed Clarification cont.)

14. Regional Sediment Evaluation Team Workshop Summary (Jim Reese, USACE, and John Malek, EPA). Mr. Reese presented a summary of the Regional Sediment Evaluation Team (RSET) and how it would incorporate the current DMMP process (but stressed that it would not replace the DMMP process). Mr. Reese started off by introducing the development, purpose, and goals of the Regional Dredging Team (RDT), which was formed in April of 2002 (PP 14.3 through 14.6). Mr. Reese mentioned that they are in the process of talking with the water quality, land management, and fish and wildlife agencies of the Northwest Division (Washington, Oregon, and Idaho) with the hope of having these agencies as participating members of the RDT.

Mr. Reese then went on to describe the Dredged Material Evaluation Framework (DMEF; PP 14.7) and how the RSET fits into that framework under the direction of the RDT (PP 14.8).

He summarized the RSET Workshop that took place in September 2002, which identified the general consensus of what was needed (PP 14.12) as well as general and specific technical needs (PP 14.13 and PP 14.14). Mr. Reese mentioned that enough funding was left over to run one more meeting in December of 2002, and provided a summary of what was discussed/accomplished (PP 14.15).

Mr. Reese closed by identifying where the process stands right now (PP 14.16). Mr. Malek added that they were trying to gather as many signatures on the Charter as soon as possible and mentioned that there is an upcoming national training course on June 11 and 12, 2003 covering new upland testing procedures sponsored by the Environmental Research and Development Center (formally known as the Waterways Experiment Station [WES]). Enrollment will open up to the general public after May 21, 2003.

> ***Question:*** Mr. Martin Payne (Ecology), asked whether they knew what system they would be using for their chemistry/toxicity database.
>
> ***Response:*** Mr. Malek (EPA) responded that that hadn't been decided yet, but that they were considering SEDQUAL.

Slides

PP 14.1 Regional Sediment Evaluation Team Workshop Summary
PP 14.2 Acknowledgements
PP 14.3 Introduction
PP 14.4 Regional Dredging Team (RDT)
PP 14.5 RDT Vision
PP 14.6 Goals of the RDT
PP 14.7 Dredged Material Evaluation Framework (DMEF)
PP 14.8 Regional Sediment Evaluation Team (RSET)
PP 14.9 RSET Workshop
PP 14.10 RSET Workshop – Purpose
PP 14.11 Technical and Breakout Sessions
PP 14.12 General Consensus
PP 14.13 General Technical Needs
PP 14.14 Specific Chemistry and Biological needs
PP 14.15 December Meeting
PP 14.16 Where Are We Now????

15. SPI Results From the PSNS Survey: Proof that Newton's 3rd Law is Still True!! (Dr. Joe Germano, Germano & Associates). Dr. Germano presented the results of a follow-up study to a SMARM 2002 presentation that Kathryn Carlin gave regarding the construction of the confined aquatic disposal (CAD) pit at the Puget Sound Naval Shipyard (PSNS) National Priorities List (NPL) site. Ms. Carlin had reported that after capping was completed, they had found evidence of contaminated sediments as far as 200 to 300 feet off-site. Ecology had asked Dr. Germano to conduct some follow-up monitoring with the Sediment Profile Imaging (SPI) camera to see if the spread of the disposed contaminated material could be mapped. Dr. Germano stated that the SPI follow-up monitoring found that the dredged material had spread 100 to 200 meters in all directions from the CAD boundary, and that this was typical of results found at other disposal site and CAD cell investigations.

Dr. Germano provided an overview of what occurs during dredging and disposal, and explained that as material is released from the barge, it moves through three phases: convective descent, dynamic collapse, and then a passive diffusive phase. Dr. Germano's presentation focused on the convective descent and dynamic collapse phases. Dr. Germano stated that it's a simple illustration of Newton's 3rd law of conservation of momentum. As dredged material is released from a split-hull barge, it moves through the water column as a consolidated mass in a jet stream (irresistible force), which hits the ocean floor (immovable object) (PP 15.4 and 15.5). All of the energy translated from the irresistible force down to the immovable object has to go somewhere, so it travels laterally (away from the disposal site

target). Dr. Germano noted that the convective descent and dynamic collapse phases occur within seconds to minutes, while the passive dispersion phase takes place over weeks to months.

Dr. Germano presented several case studies to illustrate how typical these findings were. Case studies discussed included the FVP Program Long Island Sound (PP 15.7 through 15.12), Los Angeles Harbor Borrow Pit Demo (PP 15.14 through 15.22), Los Angeles Harbor Pier 400 (PP 15.24 through 15.28), Palos Verdes Shelf Capping (PP 15.30 through 15.34), and Bremerton PSNS results (PP 15.35 through 15.41).

The Palos Verdes Shelf Capping project included a monitoring array where near bottom currents and turbidity were monitored at one up-slope location and three down-slope locations at varying distances from the disposal site target. At time = +18 minutes the pulse/high turbidity pulse (indicative of momentum caused by jet stream of disposed material) had traveled a distance of greater than 250 meters beyond the disposal site. Overall findings from various monitoring studies indicate that the more material disposed of and the deeper the water, the wider the footprint of disposed material will be.

The Bremerton PSNS study, in which the survey was conducted approximately nine months after the final capping material had been placed, was discussed. The study found that the ambient bottom had uniform cake-batter texture (PP 15.36), whereas areas of dredged material had a more consolidated texture more like plasticine clay (PP 15.37). Dr. Germano mentioned that the dredged material signature wasn't as distinct because of the rapid re-colonization of the ambient fauna, which had already bioturbated the sediment and worked the oxygen in (PP 15.37). The results of the PSNS study were summarized.

Dr. Germano closed by emphasizing the importance of public education and outreach when designing and using a CAD site, and provided a list of items to remember when planning CAD projects (PP 15.42).

Comment: Mr. Jim Reese, USACE, pointed out that there would be a special session on WES modeling at an upcoming workshop.

Question: Mr. Tom Mueller, USACE, asked if they found any correlation between the amount of water the column had to go through and how far the mound had spread, or if was it pretty similar in all studies.

Response: Dr. Germano responded that it was hard to say. In the slide where he showed the different depths and the size of the footprint, it was not an accurate comparison

because it assumed that you had strict operational control at all locations, which is not the case. At some sites, the operational control is a lot sloppier than at others. If you did control that however, you would see a correlation.

Question: Mr. Doug Hotchkiss, Port of Seattle, speculated that since this is basic physics that you should be able to figure out how deep your CAD site would have to be to correct for the momentum of the disposed material moving upward out of the CAD wall boundary. So you should be able to come back and say that if your walls are 15 feet high, that you would loose approximately X amount provided operational controls are the same. You should be able to get predictability of the walls of the CAD compared to the containment, so that you can actually use what you've learned here to move forward and say "Okay, we're going to design a CAD and how big of a spread can we live with versus what can we dig." So that instead of saying "Oh my gosh, it got outside," we can say "Okay, we're probably going to lose 50 percent with this design, 25 percent with this design, 10 percent with this design." Then it becomes just another matter of cost considerations and what you do about capping the spread of material. He wondered if anybody had examined with those numbers to see how deep you have to dig.

Response: Dr. Germano responded that Doug was correct in that you can predict and correct for the momentum of the material moving out from the disposal site target, but that he hasn't worked with the numbers because he's not an engineer and all the engineers that design these use the WES model to make their predictions. The also noted that that as you pull up and get shallower your wall height isn't as high, so you have more material slopping out. He added that if you use a tremy line, so that you're not just letting the material fall straight through the water column, you'll have less material slopping out. To illustrate this, he used the analogy of standing on the roof of your garage and dumping a 5-gallon bucket of water into a kiddy swimming pool. Obviously a lot of the water is going to slosh out the sides of the pool, but if you pour the water down the side of a piece of aluminum sheeting, the water won't be hitting the pool with the same force and less will be lost over the sides.

Question: Ms. Patty Miller, USACE, Seattle District, wondered if Dr. Germano was able to distinguish the difference between the spreading of the contaminated material versus the spread of the capping material.

Response: Dr. Germano stated that it depended on the time of monitoring. With the Los Angeles study the difference was apparent because the material was monitored immediately after placement of the contaminated material and immediately after the placement of the capping material, so that he could tell the difference between the

contaminated material and the fresh capping material. With the Bremerton PSNS it wasn't as clear-cut, because he conducted the monitoring more than nine months after the capping material was placed. He didn't know if the material was capping material or newly deposited material from the water-column.

Question: Ms. Patty Miller, USACE, Seattle District, asked if there was any consideration of the sequencing of the placement of the contaminated material being placed first, then making another deeper hole to be filled up slowly, that hasn't been set out.

Response: Dr. Germano responded that he didn't understand the question.

Response: Ms. Erika Hoffman, EPA, responded that there was no sequencing to the filling of the CAD in the Bremerton PSNS project.

Response: Dr. Germano responded that you can detect this with monitoring if you time it right.

Question: Dr. Teresa Michelsen, Avocet Consulting, mentioned that Mr. Germano brought up a good point in revising the models predicting the spread of the material, but this also brings up another point that knowing this now, the agencies are going to be more pressing about really checking your material first. She asked if he had other suggestions of how to deal with this issue.

Response: Dr. Germano responded that to him this is not a problem, because the material getting deposited outside the CAD is a very thin layer and once you know where it is you can easily account for it. The bulk of the material is going to be contained within the CAD, so he didn't see this as a big problem.

Response: Dr. Teresa Michelsen, Avocet Consulting, stated that it might be a problem for a state agency that owned that land.

Response: Dr. Germano agreed.

Question: Dr. Teresa Michelsen, stated that it was a political issue and that there are policy issues with respect to the contaminated material spilling over the CAD. She wondered what is the reality would be of using a tremy line versus a hydraulic placement, rather than just a barge dump.

Response: Dr. Germano responded that, again, it depended on water depths and then becomes a cost/benefit analysis of how much operational costs will increase, because it's would slow down the whole operation.

Comment: Mr. Tim Thompson, ReTec, mentioned a disposal site in Holland where they investigated a lot of the same questions that Teresa and others are asking. They dug their hole somewhere around 40 meters deep and sequenced the placement of the fill material by filling the bottom of the CAD with the most contaminated material. He thought that their monitoring program included the spread of the material after placement and suggested that this might be a good place to look for some additional data.

Comment: Ms. Erika Hoffman, EPA, noted that in a previous project, they contemplated for a while placing the sediment sand cap material using a tremy line in order to avoid displacing the contaminated material within the CAD during placement of the capping material.

Slides

PP 15.1 SPI Results From The PSNS Survey: Proof that Newton's 3rd Law is Still True!!
PP 15.2 Revealing the Goods
PP 15.3 Dredging & Disposal – An Overview
PP 15.4 A Brief Review of the Physics of Dredged Material Disposal
PP 15.5 A Brief Review cont.
PP 15.6 Some Case Studies to Illustrate
PP 15.7 FVP – Long Island Sound
PP 15.8 Bathymetry depth difference at FVP Site Central Long Island Sound
PP 15.9 SPI Baseline Survey, 200m S
PP 15.10 SPI Results – Post Disposal
PP 15.11 FVP Integrated SPI & Bathymetry
PP 15.12 Lessons Learned
PP 15.13 Some Case Studies to Illustrate – Los Angeles Harbor Borrow Pit Demo
PP 15.14 SPI Sampling Grid
PP 15.15 Station P-31
PP 15.16 Station P-26
PP 15.17 Station P-19
PP 15.18 Final Map of Contaminated Material (Pre-Cap)
PP 15.19 Fluorescent Tracer Results
PP 15.20 Tracer Results cont.
PP 15.21 Sediment Profile Image with Tracer

PP 15.22 Lessons Learned
PP 15.23 Some Case Studies to Illustrate – Los Angeles Harbor Pier 400
PP 15.24 Pier 400 Project – Los Angeles
PP 15.25 Pier 400 – Basic Facts
PP 15.26 SPI Example from Monitoring Phase of Project
PP 15.27 Pier 400 PSWH Final Footprint
PP 15.28 Lessons Learned
PP 15.29 Some Case Studies to Illustrate – Palos Verdes Shelf Capping
PP 15.30 Palos Verdes – Largest Capping Project Attempted
PP 15.31 Near Bottom Currents & Turbidity Monitored
PP 15.32 Array Results
PP 15.33 Conservation of Momentum Measured
PP 15.34 Spread of Mound vs. Depth
PP 15.35 PSNS Results – August, 2002
PP 15.36 PSNS – Ambient Bottom
PP 15.37 PSNS – Dredged Material
PP 15.38 PSNS – Inside CAD
PP 15.39 PSNS – Results
PP 15.40 Conclusions
PP 15.41 Conclusions cont.
PP 15.42 Conclusions cont.
PP 15.43 Questions?

16. Lower Duwamish Waterway Remedial Investigation/Feasibility Study Update (Alison Hiltner, EPA). Ms. Hiltner provided a brief summary of RI/FS activities being conducted on the Lower Duwamish Waterway (LDW). Ms. Hiltner started off by giving a brief overview of the LDW Superfund history (PP 16.3) and explained how the RI/FS process for this site has been divided up into three parts (Studies & Analyses, Cleanup Actions, and Source Controls) and two phases (Phase 1 RI and Phase 2 RI/FS) (PP 16.4 and 16.5).

The Phase 1 RI is strictly based on existing data and resulted in the following documents being submitted last year for public comment: Formal Remedial Investigation Report on the Existing Data, Identification of Candidate High Priority Sites for Urban Cleanup Actions, and Identification of Data Gaps. Reports are targeted for finalization by the end of June 2003. The Phase 2 RI/FS will be based on the collection of new data.

Ms. Hiltner then briefly discussed agency source control activities for the site and went on to summarize the Phase 1 RI results for each of the reports submitted (PP 16.7 through 16.15).

Ms. Hiltner emphasized that progress was being made on four out of the seven sites targeted for early action, and that early action cleanup activities for the three remaining sites would be based on several factors including: agency resources (do they have people to oversee the projects), do they have parties they feel should be doing the work, can they convince those parties to do the work, and how much source control do they have and is it enough to instigate early action activities.

The draft Phase 2 work plan is scheduled to be released for comment in July of 2003. Ms. Hiltner then provided an overview of the Phase 2 activities (PP 16.16) and indicated where the Phase 1 RI documents were available (PP 16.17).

Question: Mr. Jim Reese, USACE, was curious as to how EPA will handle the federal navigation channel in the LDW and if they were treating it any differently than the river bottom.

Response: Ms. Hiltner responded that they weren't making any distinctions as to whether they were in the navigation channel or not when considering where they are taking samples.

Comment: Mr. Tad Deschler, Windward Consulting, mentioned that a lot of the documents for the LDW are available on the website for the LDW group at ldwg.org.

Slides

PP 16.1 Lower Duwamish Waterway Remedial Investigation/Feasibility Study Update
PP 16.2 Lower Duwamish Waterway Superfund Site Study Area
PP 16.3 Lower Duwamish Waterway Superfund Site History
PP 16.4 Lower Duwamish Waterway Remedial Investigation/Feasibility Study (RI/FS) Process
PP 16.5 Lower Duwamish Waterway Remedial Investigation/Feasibility Study (RI/FS) Process – Phase 1 RI
PP 16.6 Lower Duwamish Waterway Source Control Activities
PP 16.7 Lower Duwamish Waterway Phase 1 Remedial Investigation
PP 16.8 Human Health Risk Characterization
PP 16.9 Uncertainty Analysis
PP 16.10 Results of Ecological Risk Assessment
PP 16.11 Uncertainty Analysis
PP 16.12 Identification of Candidate Sites for Early Action
PP 16.13 Candidate Early Action Sites

PP 16.14 Early Action Sites
PP 16.15 Identification of Data Gaps
PP 16.16 Lower Duwamish Waterway Remedial Investigation/Feasibility Study (RI/FS) Process – Phase 2 RI/FS
PP 16.17 Documents are available at these locations

17. Use of Silt Curtains in Dredging Projects (Clay Patmont, Anchor Environmental, LLC). Mr. Patmont provided a brief history regarding why silt curtains were being requested for dredging projects with greater than 1 ppm total PAHs in the sediments (PP 17.2 and 17.3) and asked that the DMMP evaluate Best Management Practices (BMPs) and provide recommendations regarding the use of silt curtains for future projects.

Mr. Patmont identified concerns associated with the use of silt curtains (PP 17.4 and 17.5) and summarized operational BMPs already implemented during dredging operations (PP 17.6).

Mr. Patmont closed by requesting that the DMMP evaluate existing case study results and provide recommendations of BMPs in use, including silt curtains (PP 17.7). Mr. Patmont emphasized the costs associated with using silt curtains near an active dock and questioned their effectiveness.

Slides

PP 17.1 Use of Silt Curtains in Dredging Projects
PP 17.2 Issue Summary
PP 17.3 Basis of NOAA Concern
PP 17.4 Silt Curtain Concerns
PP 17.5 Silt Curtain Concerns continued.
PP 17.6 Operational BMPs Used in Puget Sound
PP 17.7 Request – DMMP Evaluation of BMPs

GENERAL QUESTIONS:

Question: Mr. Tim Thompson, ReTec, asked John Malek whether EPA has a dioxin number for sediments yet.

Response: Mr. John Malek responded that they are still working on it and that they don't have any "official" numbers yet. The numbers out there right now are still in effect and are: 5 pptr TCDD and 15 pptr TEC. If these numbers are exceeded it doesn't mean that they have failed – it only means that the agencies will request that more work be done.

CLOSING

There were no substantive issues during the meeting that require DMMP agency deliberation or action. Therefore, Ms. Parks closed the meeting and invited everyone to the social hour at the Pyramid Alehouse.

Attachment 1
Agenda

Sediment Management Annual Review Meeting

May 7, 2003
Federal Center South, Seattle
Hosted by Seattle District, Corps of Engineers

Registration and Coffee.....8:30-9:00
Welcome to SMARM 20003 (Diane Parks, Chief of Operations, Corps 9:00-9:05
Opening Remarks (Col. Ralph Graves, District Engineer, Seattle).....9:05-9:10
Agency Summary Reports 9:15-10:15

- Corps (Summary of DMMP Testing Activities, David Kendall, Corps)
- DNR (Summary of DNR Disposal and Monitoring Activities, Peter Leon, DNR)
- Ecology(Summary of SMS Cleanup Activities, Lori Cohen, EPA

BREAK 10:15-10:30
DMMP/SMS Presentations 10:30-11:45

- Summary Overview of Clarification Papers (Lauran Cole-Warner, Corps)
- New Site Use Authorization Language (Peter Leon and Leight Epsy, DNR)
- Disposal Site Fee Increase (Loren Stearn, DNR)
- Bioaccumulation (Erika Hoffman, EPA)
- Questions and Answers (on any of the above presentations)

LUNCH (on your own) 11:45-12:45
DMMP/SMS Presentations (continued).....12:45-2:15

- SEDQUAL Update (Martin Payne, Ecology)
- Use of GIS to Evaluate Sediment Cleanup Sites (Maureen Goff, SAIC for Ecology)
- Freshwater Screening Levels (Teresa Michelsen, Avocet Consulting for Ecology)
- ECRT Pilot Treatment Study in Bellingham Bay (Brad Helland, Ecology)
- Determining When Material Above Mean/Ordinary High Water will be Characterized under DMMP (Tom Gries, Ecology)
- Questions and Answers

BREAK 2:15-2:30
Regional Sediment Team.....2:30-2:45
Jim Reese (Northwestern Division, Corps) and John Malek (EPA)
Topical Presentations.....2:45-3:45

- CAD Designs: Lessons Learned (Joe Germano, Germano & Associates)
- Duwamish Waterway Superfund Site (Allison Hiltner, EPA)

Public Issue Papers 3:45-4:45

- Use of Silt Curtains in Dredging Projects (Clay Patmont, Anchor Environmental)

Summary and Closing 4:45-5:00

Attachment 2
List of Attendees

Sediment Management Annual Review Meeting
List of Attendees

NAME	AGENCY/ADDRESS	E-MAIL
Barton, Justine	EPA Region 10	mailto:barton.justine@epa.gov
Benson, Ted	NRDA - Ecology	mailto:tben461@ecy.wa.gov
Betts, Brett	Ecology	mailto:bbet461@ecy.wa.gov
Bourbonais, Katherine	KC - Environmental Lab	mailto:katherine.bourbonais@metrokc.gov
Brenner, Robert	WDNR	mailto:robert.brenner@wadnr.gov
Briner, Wendy	USACE - CENWP	mailto:wendy.k.briner@usace.army.mil
Brown, Sharon R.	Ecology	mailto:sbro461@ecy.wa.gov
Caldwell, Richard	NW Aquatic Sciences	mailto:rcaldwell@nwaquatic.com
Carlin, Kathryn	Dept of Ecology	mailto:kbco461@ecy.wa.gov
Chen, Joy	Jones & Stokes	mailto:johen@jsanet.com
Childs, John	Port of Portland	mailto:childj@portptld.com
Cohen, Lori	EPA	mailto:cohen.lori@epa.gov
Colburn, Gail C.	Dept of Ecology	mailto:gcol461@ecy.wa.gov
Compeau, Geoff	Shaw Environmental	mailto:geoffrey.compeau@shawgrp.com
Deshler, Tad	Windward Environmental	mailto:tad@windwardenv.com
Dohrmann, John	PSAT	mailto:jdohrmann@psat.wa.gov
Dryden, Mike	Severn Trent	mailto:mdryden@stl-inc.com
Dunn, Shannon	Landau Assoc	mailto:sdunn@landauinc.com
Dunnihoo, Susan	Analytical Resources Inc.	mailto:sue@arilabs.com
Ebner, Donna	CENWP	mailto:donna.b.ebner@nwp01.usace.army.mil
Eckhoff, Joe	Sanders & Assoc Inc.	mailto:company@saiengineering.com
Eickhoff, Curtis	BC Research Inc.	mailto:ceickhoff@bcresearch.com
England, Victoria	GeoEngineers	mailto:vengland@geoengineers.com
Essig, Matt	Severn Trent	mailto:messig@stl-inc.com
Fisher, Sally	GeoEngineers	mailto:sfisher@geoengineers.com
Gallagher, Mike	Dept of Ecology	mailto:mgal461@ecy.wa.gov
Gardiner, William W.	MEC	mailto:gardiner@mecanalytical.com
Geiselbrecht, Allison	Floyd Snider McCarthy	mailto:allisong@fsmseattle.com
Germano, Joe	Germano & Associates	mailto:joe@remots.com
Gibbons, Tom	DNR	mailto:tom.gibbons@wadnr.gov
Gilmour, Rob	MCS Environmental	rmailto:.gilmour@mcs-environmental.com
Gilmur, Dick	Port of Tacoma	mailto:dickg@portoftacoma.com
Godtfredsen, Kathy	Windward Environmental	mailto:kathyg@windwardenv.com
Goff, Maureen	SAIC	mailto:goffm@saic.com

Sediment Management Annual Review Meeting
List of Attendees

NAME	AGENCY/ADDRESS	E-MAIL
Gramling, Jessica	Corps	mailto:jessica.r.gramling@usace.army.mil
Gries, Tom	WA Dept of Ecology	mailto:tgri461@ecy.wa.gov
Hanlon-Meyer, Chris	DNR	mailto:chris.hanlon-meyer@wadnr.gov
Hanzlick, Dennis	Anchor Env	mailto:dhanzlick@anchorenv.com
Hart, George	Corps	mailto:george.a.hart@usace.army.mil
Helland, Brad	Ecology	mailto:bhel461@ecy.wa.gov
Hicks, John	Shaw ETI	mailto:john.hicks@shawgrp.com
Hiltner, Alison	EPA	mailto:hiltner.allison@epa.gov
Hoffman, Erika	EPA Region 10	mailto:hoffman.erika@epa,gov
Hotchkiss, Doug	Port of Seattle	mailto:hotchkiss.d@portofseattle.org
Hughes, Meg	EVS Environmental	mailto:mhughes@evsenvironmental.com
Johnson, Eric	WA Public Ports Assoc	mailto:ericj@washingtonports.org
Johnson, Keith	Oregon DEQ	mailto:johnson.keith@deq.state.or.us
Kassebaum, Carl	CRK Env.	mailto:ckassebaum@attbi.com
Kendall, David	Corps / DMMO	mailto:david.r.kendall@usace.army.mil
Kinnee, Karen	BC Research Inc.	mailto:kkinnee@bcresearch.com
Kohn, Nancy	Battelle Marine Systems	mailto:nancy.kohn@pnl.gov
Kulman, Dave	EPA Region 10	mailto:david.kulman@epa.gov
Lee, Fu-Shin	Ecology	mailto:flee461@ecy.wa.gov
Leon, Peter	DNR	peter.leon@wadnr.gov
Liebl, Matthew	AMEC Earth & Environmental	mailto:matthew.liebl@amec.com
Loehr, Lincoln	Heller Ehrman	mailto:lloehr@hewm.com
Luecker, Liz	CH2M Hill	mailto:lluecker@ch2m.com
Magruder, Kimberly	Anchor Env	mailto:kmagruder@anchorenv.com
Malek, John	EPA Region 10	mailto:malek.john@epa.gov
Martin, Stephen	Corps/Planning Br	mailto:stephen.g.martin@usace.army.mil
McDermott, Marian	CH2M Hill	mailto:mmcdermo@ch2m.com
McFarland, Brendon	Ecology - Sea Program	bmcf461@ecy.wa.gov
McMillan, Russ	Dept of Ecology	mailto:rmcm461@ecy.wa.gov
Michelsen, Teresa	Avocet	mailto:teresa@avocetconsulting.com
Moosburner, Otto	EPA Region 10	mailto:moosburner.otto@epa.gov
Mueller, Tom	Corps - Regulatory	mailto:thomas.f.mueller@usace.army.mil
Musgrove, Nancy	MER	mailto:m.e.r@attglobal.net
Myre, Peggy	EXA Data & Map	mailto:peggy.myre@verizon.net
Nakayama, John	SAIC	mailto:john.s.nakayama@saic.com

Sediment Management Annual Review Meeting
List of Attendees

NAME	AGENCY/ADDRESS	E-MAIL
Nelson, Robin	Striplin Environmental	mailto:rnelson@striplin.com
O'Brien, Maura S.	WA Dept of Ecology	mailto:mobr461@ecy.wa.gov
O'Haleck, Shandra	NOAA Fisheries	mailto:shandra.ohaleck@noaa.gov
Pascoe, Gary	Pascoe Environmental	mailto:gpascoe@olympus.net
Payne, A. Martin	Ecology	mailto:mpay461@ecy.wa.gov
Pendowski, Jim	Dept of Ecology	mailto:jpen461@ecy.wa.gov
Petrillo, Tony	Blue Water Engineering	mailto:bluewater@seanet.com
Pine, Keith	Striplin Environmental	mailto:kpine@striplin.com
Powell, Darla	STL	mailto:dpowell@stl-inc.com
Ramsden, Jerry	Parsons Brinckerhoff	mailto:ramsden@pbworld.com
Roach, Lisa		mailto:nlroach@seanet.com
Salata, Gregory	CAS	mailto:gsalata@kelso.caslab.com
Sanga, Ravi	EPA Region 10	mailto:sanga.ravi@epa.gov
Shephard, Burt	URS	mailto:burt_shephard@urscorp.com
Sherman, Tim	CENWP	mailto:timothy.j.sherman@usace.army.mil
Silvernale, Marya	City of Seattle	mailto:maryasilvernale@seattle.gov
Skadowski, Suzanne	COE-OD-RG	mailto:suzanne.a.skadowski@usace.army.mil
Snowski, Joanne	DNR	mailto:joanne.snowski@wadnr.gov
Sparks, Pamela	Striplin Environmental	mailto:psparks@striplin.com
St. Amant, Glen	Muckleshoot Indian Tribe	glen.stamant@muckleshoot.nsn.us
Stern, Jeff	King County DNR	mailto:jeff.stern@metrokc.gov
Stern, Loren	WA Dept of Natural Resources	mailto:loren.stern@wadnr.gov
Stirling, Stephanie	Coprs / DMMO	mailto:stephanie.k.stirling@usace.army.mil
Stoltz, Pete	Glacier NW	mailto:pstoltz@glaciernw.com
Stott, Tim	Coast Guard	mailto:tstott@pacnorwest.uscg.mil
Striplin, Peter	CEA	mailto:peterstriplin@attbi.com
Stupakoff, Ian	Striplin Environmental	mailto:stupakoff@striplin.com
Sutter, Jennifer	Oregon DEQ	mailto:sutter.jennifer@deq.state.or.us
Thompson, Tim	RETEC	mailto:tthompson@retec.com
Turk, Ted	SAIC	mailto:turkt@saic.com
Uhrich, Ann	Corps/Regulatory	mailto:ann.r.uhrich@usace.army.mil
Vogel, John	US Coast Guard	mailto:jvogel@pacnorwest.uscg.mil
Ward, Jeff	Battelle	mailto:ja.ward@pnl.gov
Warner, Lauran Cole	USACE	mailto:Lauran.c.warner@usace.army.mil
William, Jonathan	EPA Region 10	william.jonathan@epa.gov

Sediment Management Annual Review Meeting
List of Attendees

NAME	AGENCY/ADDRESS	E-MAIL
Williams, Les	Integral Consulting	lwilliams@integral-corp,com
Willmann, Frank H.	Waste Management	fwillman@wm.com
Wingard, Iain	Floyd Snider McCarthy	iainw@fsmseattle.com
Wishik, Laura	City of Seattle	laura.wishik@seattle.gov
Word, Jack	MEC	word@mecanalytical.com
Yang, Grant	WA Dept of Ecology	gyan461@ecy.wa.gov
Young, Aaron	Amtest	finallykathy@aol.com

ATTACHMENT 3

Post-SMARM Comments and Responses

SMARM Responsiveness Summary

DMMP Clarification and Issue Papers

Clarification Paper: "Determining When Material Above Mean/Ordinary High Water Will be Characterized Under the DMMP" (Draft May 7, 2003).

The DMMP agencies received a single letter, from the Port of Tacoma, regarding the clarifications proposed in this paper (see attached Port letter). Major comments are summarized in the bullets below, followed by the agencies' joint responses.

1. **Comment**

   'To be evaluated as dredged material under the DMMP, the action to excavate material from beyond the reasonable angle of repose must be ecologically beneficial to either the dredging site or the designated open-water disposal site, but not both, as stated in the clarification paper' i.e., "EPTA provides for either A or B to exist" (first part of comment paraphrased from original letter).

   Response

   Nearly all of the clarification and issue papers prepared during the past 15 years have represented a strong consensus position among the DMMP agencies and staff. However, in preparing initial drafts of this clarification paper, it became apparent that neither the intent of the language in EPTA, nor the language itself, was completely clear. There were different opinions about what EPTA intended and what it states. After extensive discussions, most staff agreed that the EPTA language appeared to require ecological benefits at both the dredging and disposal site for material excavated from beyond the reasonable angle of repose to be evaluated as dredged material. Thus, we proposed the May 2003 clarification. But we did so with some uncertainty about our interpretation of EPTA and hoping the paper would elicit public comments (in keeping with the program's open annual review process).

   Prior to receiving comments from the Port of Tacoma, we consulted others involved in the original development of EPTA who concurred with the Port's interpretation. After receiving the Port's June 19, 2003 letter, we discussed this comment further. We now agree with the Port's interpretation and have revised the clarification paper accordingly.

   The primary goal of EPTA was to provide evaluation guidelines that would protect the benthic community found at the disposal site (Site Condition II allows

only minor adverse effects). To meet this goal, any materials excavated from beyond the reasonable angle of repose should be ecologically beneficial to the intended disposal site (e.g., chemically, toxicologically or in some other way "cleaner"). The majority of DMMP staff interprets "benefit", in this case, to mean relative to the site's baseline condition. Placement of such excavated material must improve the condition of the site relative to the baseline survey data.

A secondary intent of EPTA was to promote creation and/or enhancement of aquatic habitats. To do this, it appears that the agencies agreed to allow evaluating material excavated from beyond the reasonable angle of repose as dredged material if it results in ecological benefit to the dredging site (and not exceed disposal site guidelines).

2. **Comment**

"It is hard to imagine a clarification paper being based on an initial misinterpretation of the issue trying to be clarified. This makes the entire effort appear very arbitrary to the reviewer and generates concerns about the DMMP process being exhibited on this matter. It also raises concerns about what sort of things may not be as transparent or equally evident to the reviewing public as part of this 'clarification' process and paper."

Response

Technical and policy issues in sediment management are often quite complex, especially when each new project is slightly different. With this in mind, the above statement of fact that "most clarification and issue papers prepared during the past 15 years represent a strong consensus position among the DMMP agencies and staff" is somewhat remarkable.

In addition, it should be noted that the process of preparing clarification and issue papers for presentation to the public as part of the annual review process (Final PSDDA EIS) has not changed. It is neither arbitrary nor hurried. Neither the DMMP agency staff nor the public have ever had to address such a difficulty in application of unclear guidance language to projects whose nature was never foreseen by the authors of EPTA. Rest assured that the SMARM process will continue to be as open and responsive as it has always been. If this paper raises concerns over the process by which the DMMP program evolves, whether on the part of the Port of Tacoma or any other member of the public, then we welcome recommendations for ways to improve it.

3. **Comment**

"It should also be noted that the results of monitoring at the Commencement Bay disposal site have not indicated adverse impacts to the aquatic environment due to the placement of shoreline cutback material from previous expansion projects."

Response

The DMMP agencies agree with this statement. However, the volume and fine-grained nature of Blair Waterway sediments that have been placed at the Commencement Bay open-water disposal site over a relatively short period of time did result in a much larger footprint of dredged material than was predicted by early models. As a result, the agencies have gone to great lengths to show that the material discovered beyond the disposal site boundary only represents a *de minimis* volume and has not caused more than minor adverse biological effects.

4. **Comment**

"Further, the Port does not believe it is appropriate to redefine the interpretation and application of EPTA due to concerns about disposal site capacity issues. There are other remedies available to the agencies and the program to properly address and rectify these long-term issues to ensure the continued viability and vitality of the DMMP for the Puget Sound community."

Response

This clarification paper didn't originate with concerns about the limited remaining capacity of the nearby Commencement Bay disposal site. Please see page 5 of both the draft and final papers: "Open-water disposal capacity exists and is provided on a regional basis, so available capacity of the nearest open-water disposal site should not be a factor in this determination." The main concern was over potentially inappropriate management of "waste", e.g., disposal of what might legitimately be considered a solid waste in a manner reserved for dredged material.

5. **Comment**

"The Port believes that the benefits of the constructing additional subtidal and water column habitat during future shoreline cutback dredging projects should not be discounted by the DMMP, regardless of the condition of the slope."

Response

The final clarification paper has been revised, if only slightly. The agencies still believe that dredging that only creates new open water habitat should not

generally be considered beneficial to the dredging site. However, on a project-specific basis, we will confer with and accept the opinion of various resource agencies and/or other entities before making future decisions in this regard.

6. **Comment**

'Ecological benefits to the dredging site SHOULD include those associated with of-site mitigation' (language paraphrased, emphasis added).

Response

See response to Comment #1. The specific language found in EPTA does not appear to allow the broader definition of "dredging site" that the Port proposes. We believe the term "dredging site" was intended to apply only to the project site itself, and not to include off-site areas where mitigation is required. The agencies are open to discussing the Port's comment further and to proposing an amendment to EPTA that would broaden what are considered "benefits to the dredging site" to include creation/enhancement of off-site habitat.

7. **Comment**

"As the majority of issues raised by the DMMP in the Draft Clarification Paper" seem based on either past Port projects or pending Port projects, it may be best to address these face-to-face rather than in a revised paper."

Response

The DMMP agencies believe it is appropriate to revise and finalize this paper because it attempts to clarify difficult programmatic issues that are not specific to Port of Tacoma projects. The agencies have, in fact, evaluated a few shoreline cutback dredging projects other than those proposed by the Port of Tacoma. But it was the scale and nature of the recent the Pierce County Terminal turning basin cutback project, Blair Waterway, that raised our level of concern.

DMMP staff discussed many of the issues described in this clarification paper with one or more Port representatives at the inception of the project and various points thereafter. This was especially the case when the extent of the proposed cutback changed (more than once). We also began raising some of these issues with the Port of Tacoma in a greater policy context as early as December 2002.

We drafted a clarification paper with good intentions, believing it accurately reflected the original intent of EPTA and those who were instrumental in establishing the original the PSDDA program. The Port of Tacoma was the only entity that chose to comment on the need for and content of the proposed clarifications. We are responding to the Port comments by revising the paper and preparing this "responsiveness summary". We would be happy to meet with Port

officials face-to-face to discuss this clarification paper further.

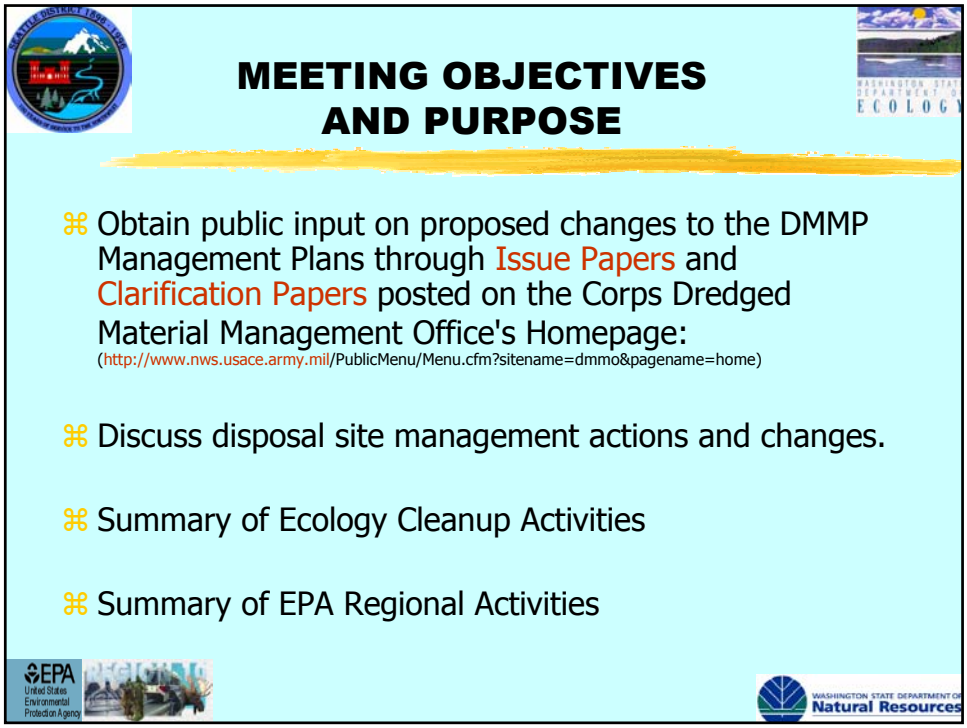
The DMMP agencies are always willing to discuss policy or technical issues with any regulated entity or member of the public at large.

Attachment 4

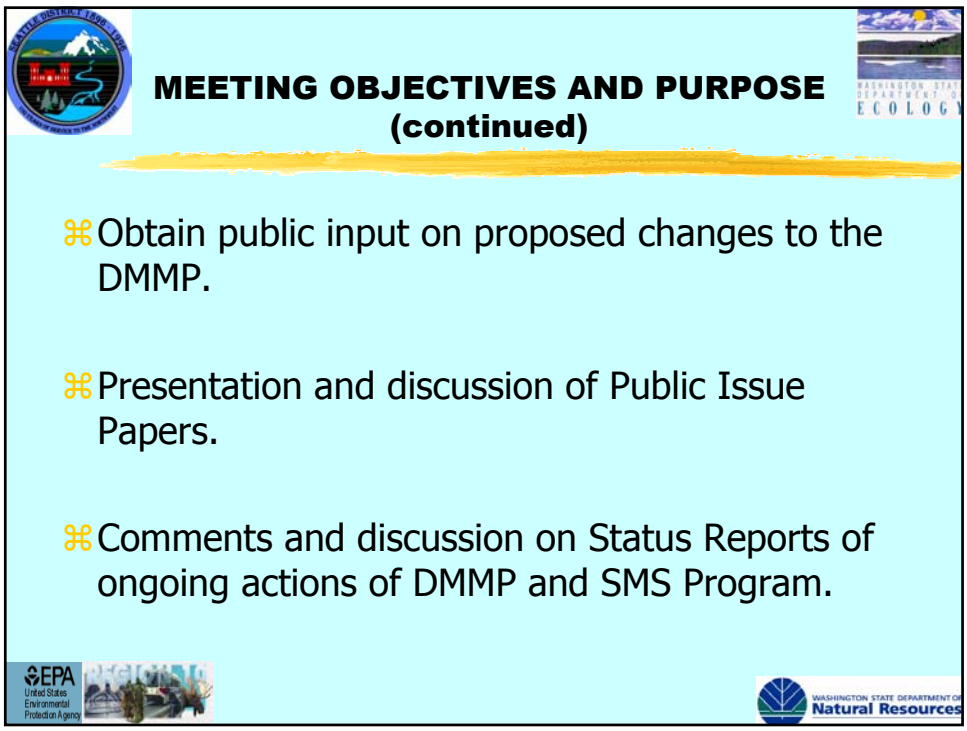
Powerpoint Slides for each SMARM Speaker

PP 1.1. Sediment Management Annual Review Meeting

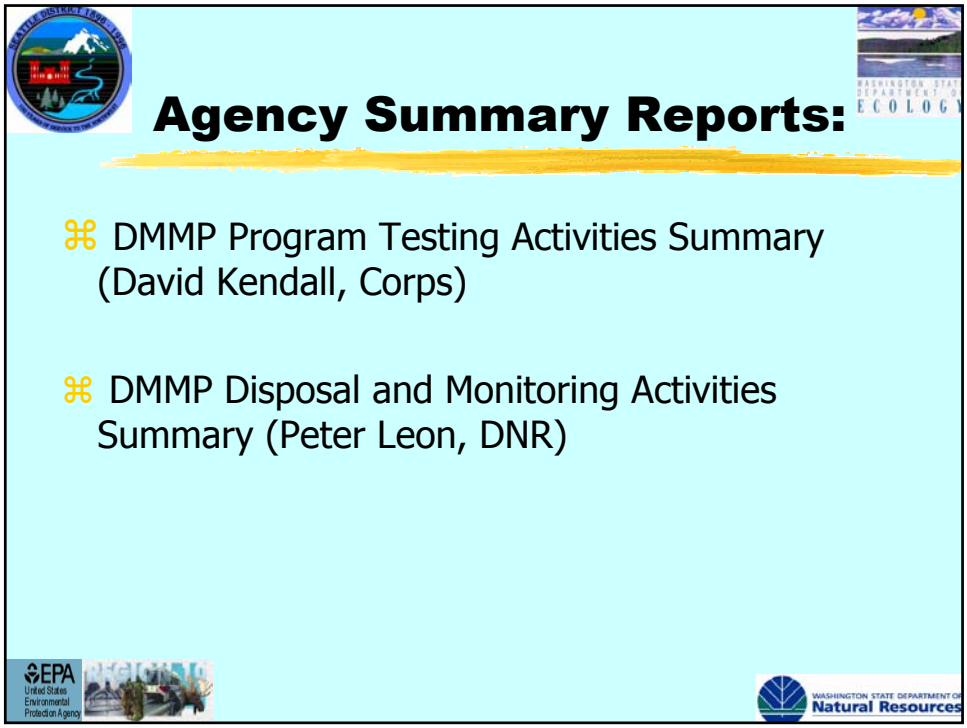
PP 1.2. 2003 SMARM



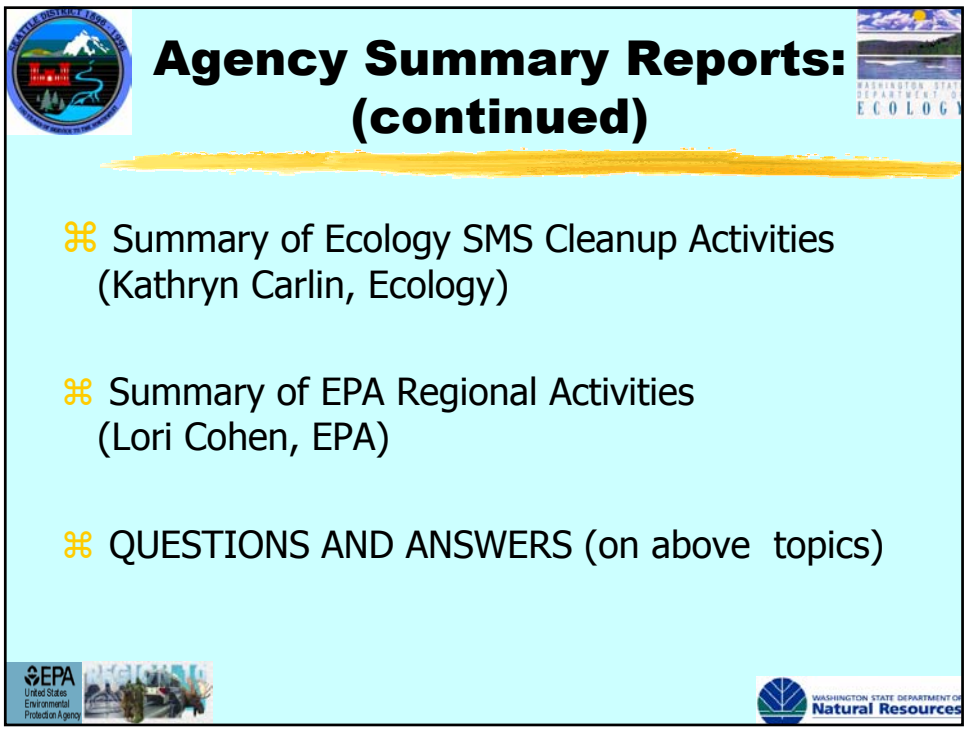
PP 1.3. Meeting Objectives and Purpose



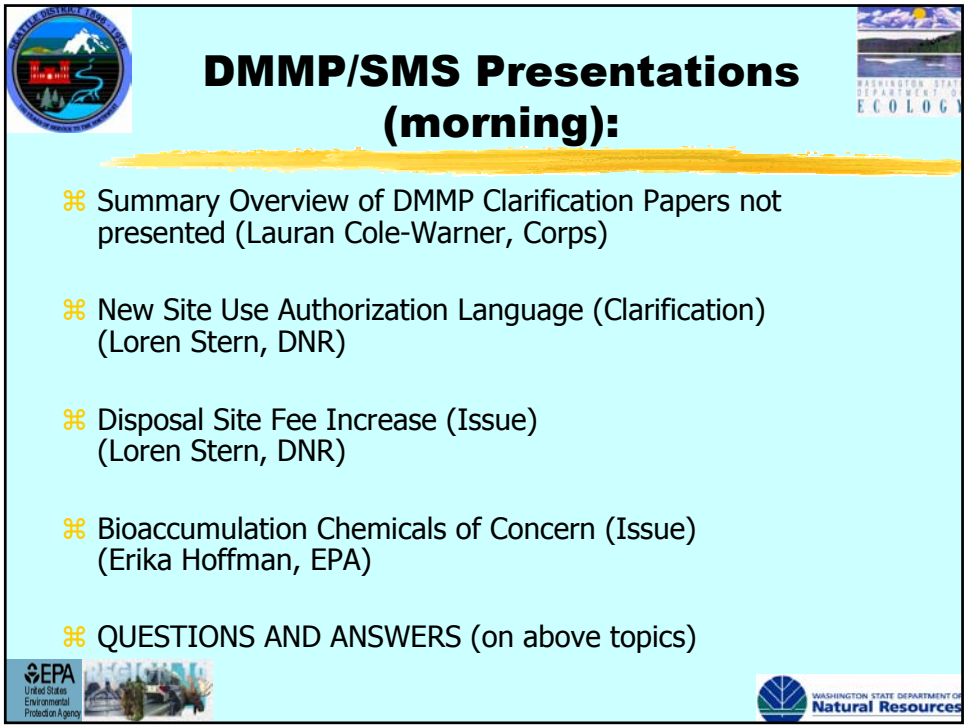
PP 1.4. Meeting Objectives and Purpose (continued)



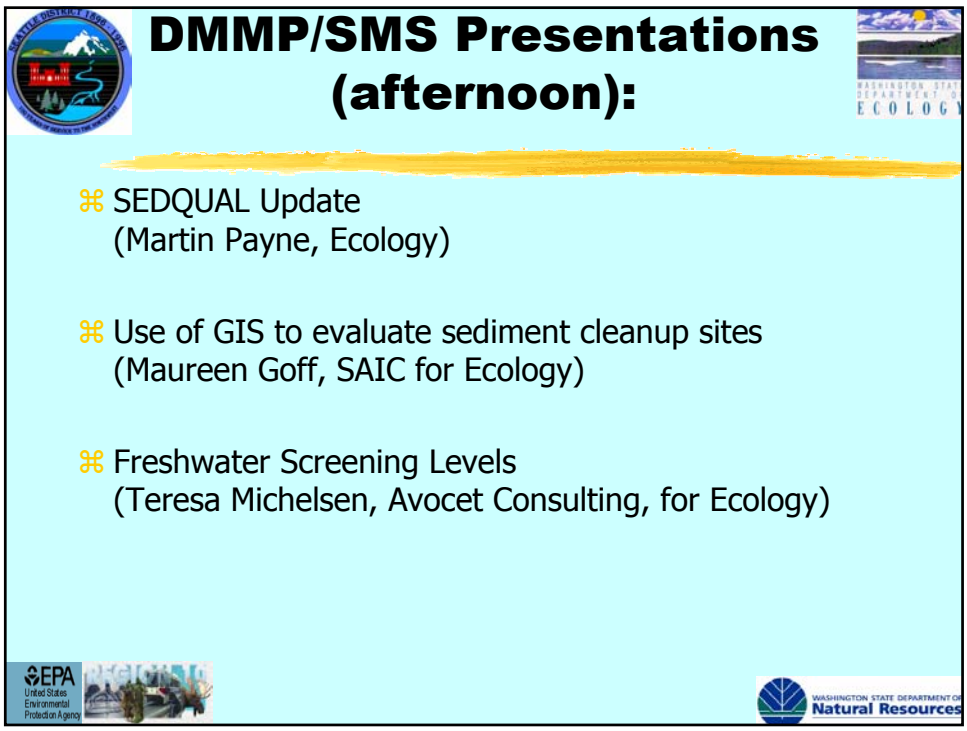
PP 1.5. Agency Summary Reports



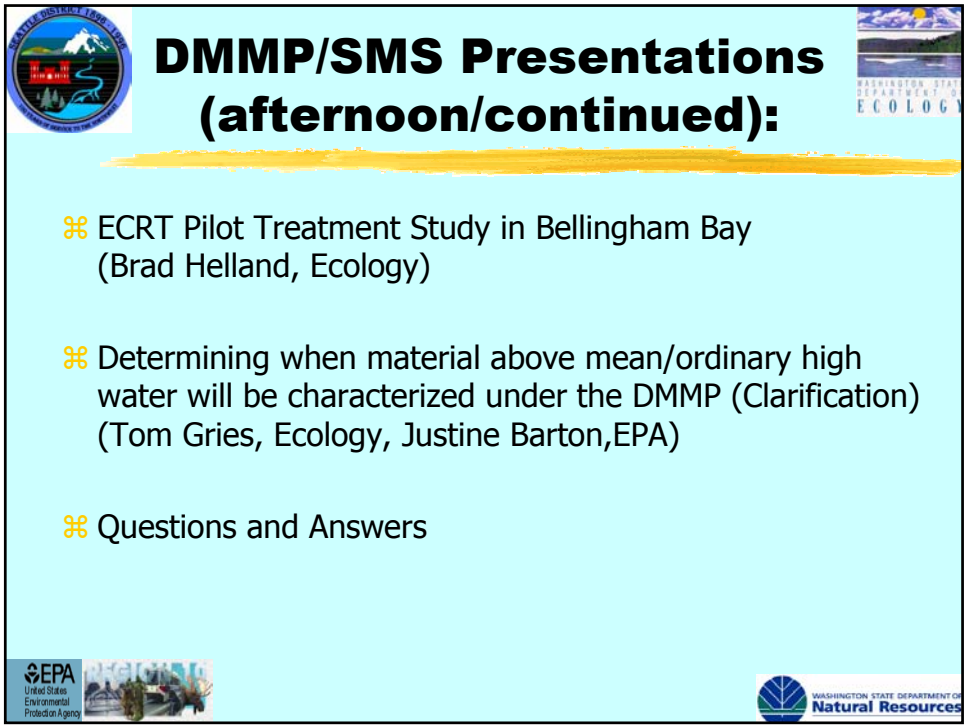
PP 1.6. Agency Summary Reports (continued)



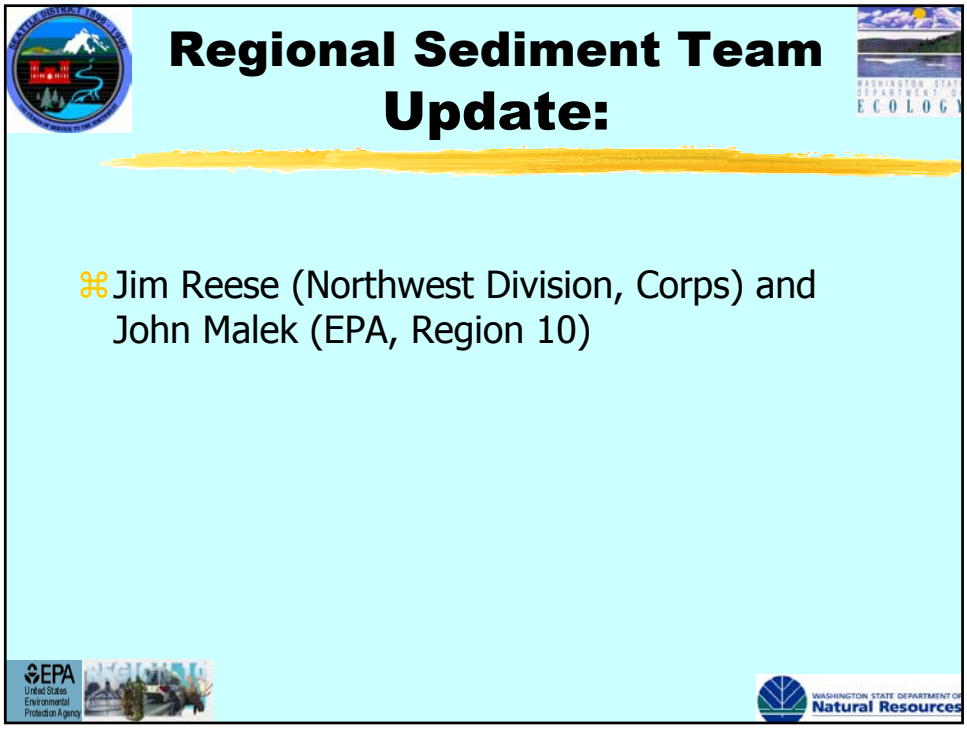
PP 1.7. DMMP/SMS Presentations (morning)



PP 1.8. DMMP/SMS Presentations (afternoon)



PP 1.9. DMMP/SMS Presentations (afternoon/continued)



PP 1.10. Regional Sediment Team Update

Topical Presentations

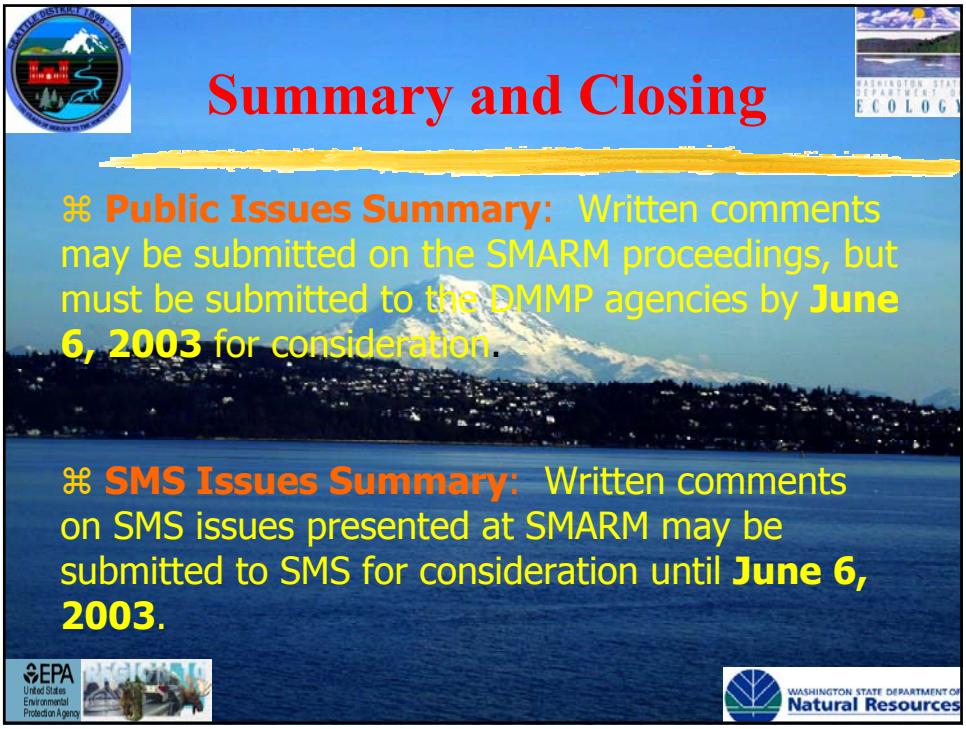
- Confined Aquatic Disposal (CAD) Designs: Lessons Learned (Joe Germano & Associates)
- Duwamish Waterway Superfund Site (Alison Hiltner, EPA)

PP 1.11. Topical Presentations

Public Issue Papers

- Use of Silt Curtains in dredging projects (Clay Patmont, Anchor Environmental)

PP 1.12. Public Issue Papers



PP 1.13. Summary and Closing

PP 2.1. Dredging Year 2003 Testing Activities (DMMP Program)

PP 2.2. Overview of DMMP Program Activities

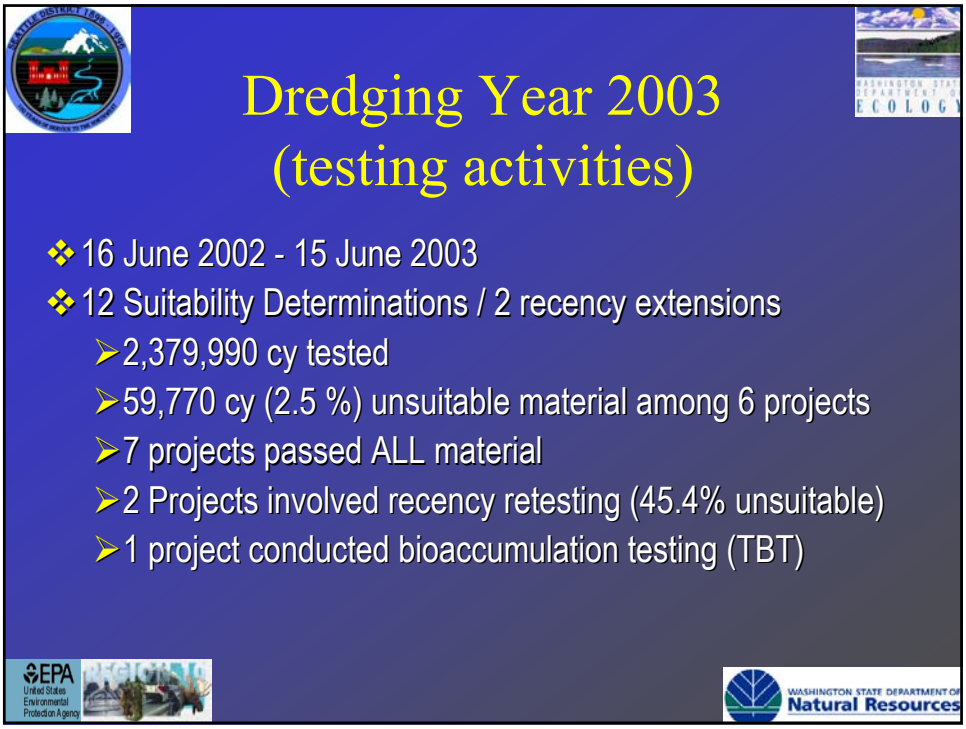
Post 2002 SMARM Changes Implemented in DMMP

- Ammonia and amphipod testing (clarification)
- Recency Guideline Clarification
- Volume Trigger for Disposal Site Monitoring (raised to 500,000 cy at Commencement Bay, Elliott Bay, and Port Gardner sites)

PP 2.3. Post 2002 SMARM Changes Implemented in DMMP

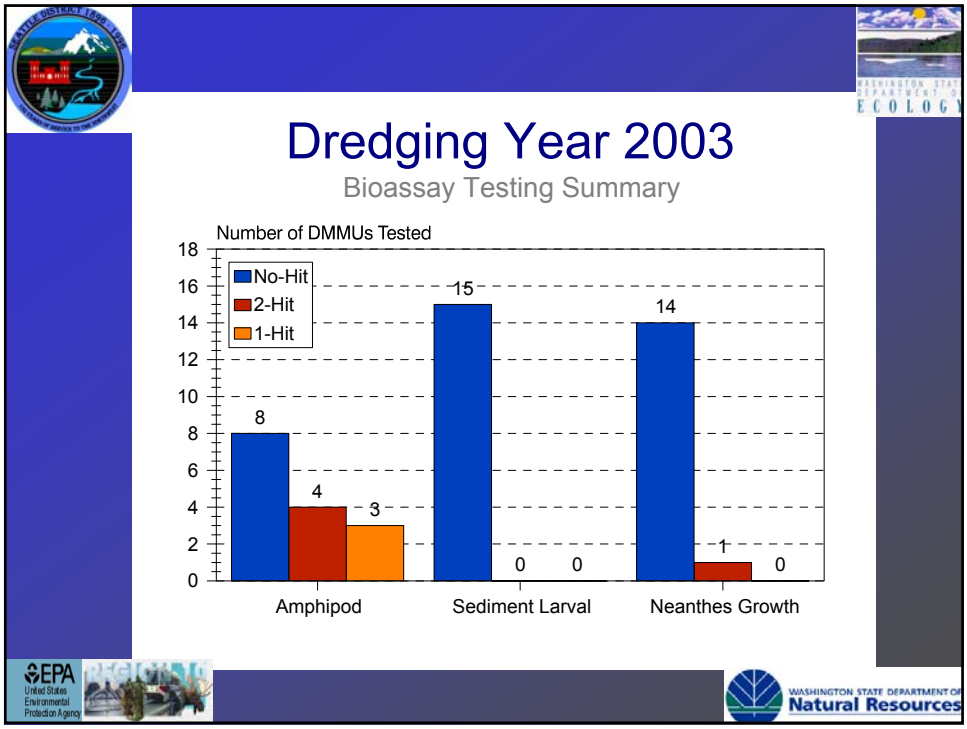
Adaptive Management

PP 2.4. Adaptive Management

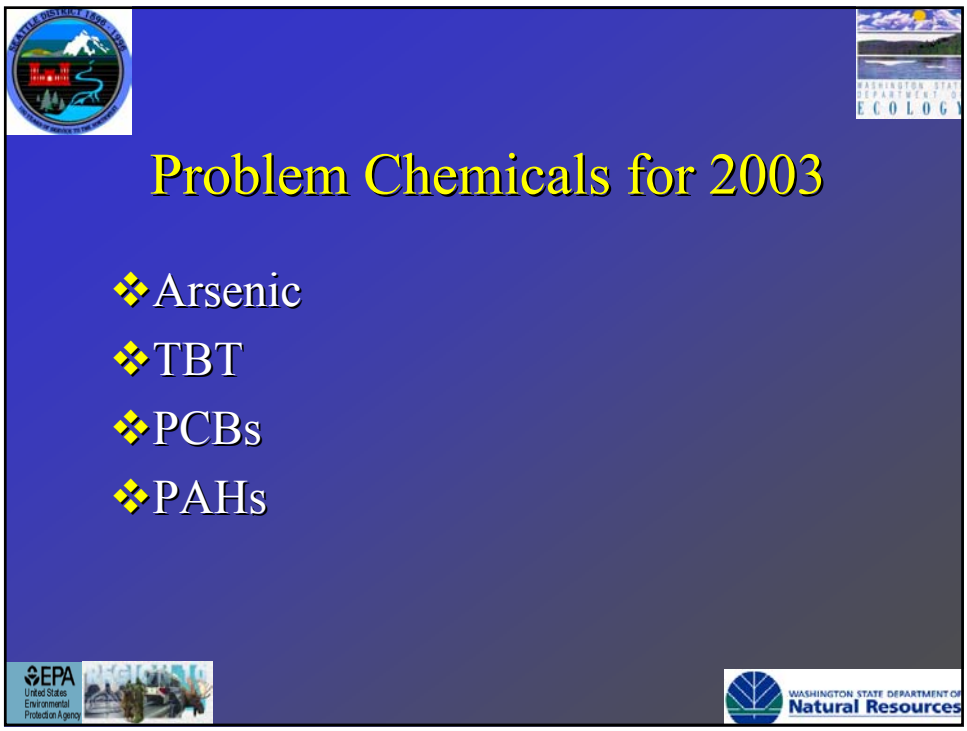


PP 2.5. Dredging Year 2003 (testing activities)

PP 2.6. Dredging Year 2003 (continued)



PP 2.7. Dredging Year 2003



PP 2.8. Problem Chemicals for 2003

Ongoing/Future Projects

- Port of Tacoma / Blair Bridge Widening (Inner Reach Cutback) Project (265,000 cy)(sampling and analysis plan submitted, currently under DMMP review)

- Port of Tacoma / Turning Basin Expansion Project (approximately 2.2 million cy)(SAP under development, anticipate submittal to DMMP soon)

PP 2.9. Ongoing/Future Projects

DMMP Ongoing Action Issues

- Beneficial uses
  - Half Moon Bay (approximately 300,000 cy proposed for South Beach site in DY04)
- Site monitoring proposed at Commencement Bay 2003
- Further evaluation of Commencement Bay future site use, the actual and predicted dredged material footprint, and likely mound height evaluation with ST-Fate Modeling ongoing.
- Revised Bioaccumulative Chemicals of Concern List and interim bioaccumulation triggers proposed for implementation!

PP 2.10. DMMP Ongoing Action Issues

Policy Deliberations

PP 2.11. Policy Deliberations

DMMP Ongoing Technical/Policy Action Issues

- Determining when material above mean/ordinary high water will be characterized under the DMMP (DMMP Policy Clarification).
- The effects of dredging and disposal on Invasive Species distribution?
- Commencement Bay Disposal Site Capacity

PP 2.12. DMMP Ongoing Technical/Policy Action Issues

PP 2.13. For more DMMP information

PP 2.14. The end

PP 3.1. 2002 Tiered Partial Monitoring at the Elliot Bay Disposal Site

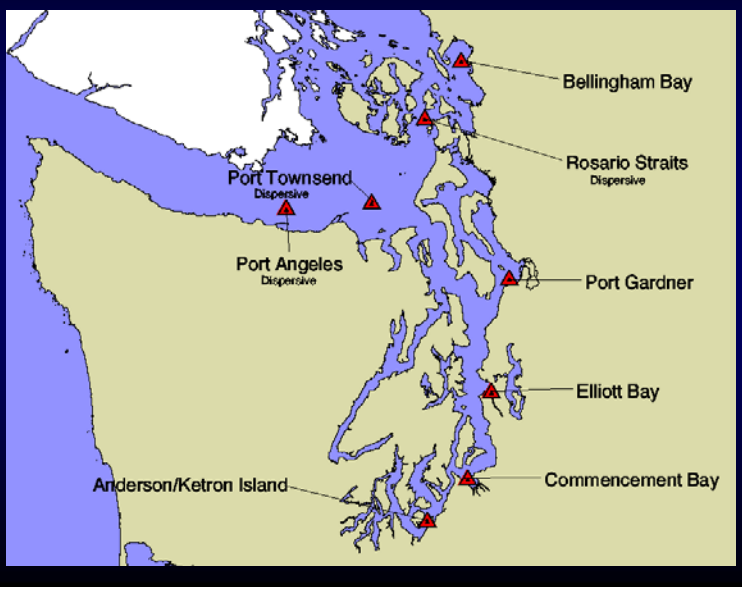
PP 3.2. Agenda

The Rules

- Be nice to me, I'm new.
- If I don't know the answer, I will find it for you.

PP 3.3. The Rules

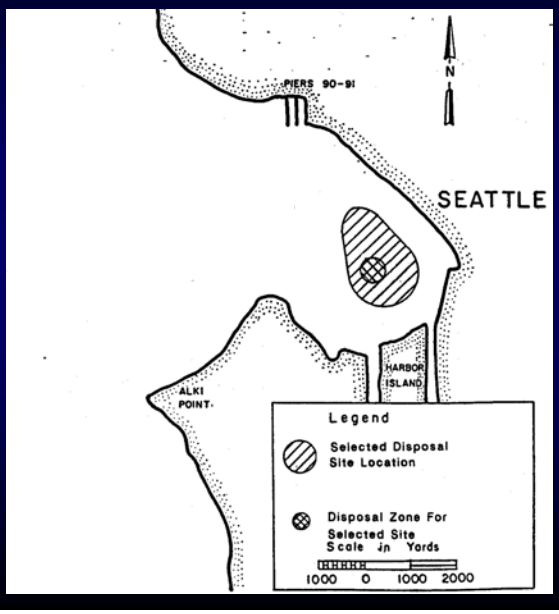
DMMP Sites in Puget Sound



PP 3.4. DMMP Sites in Puget Sound

Elliot Bay Disposal Site

Lat. 47d 35.96m
Lon. 122d 21.45m

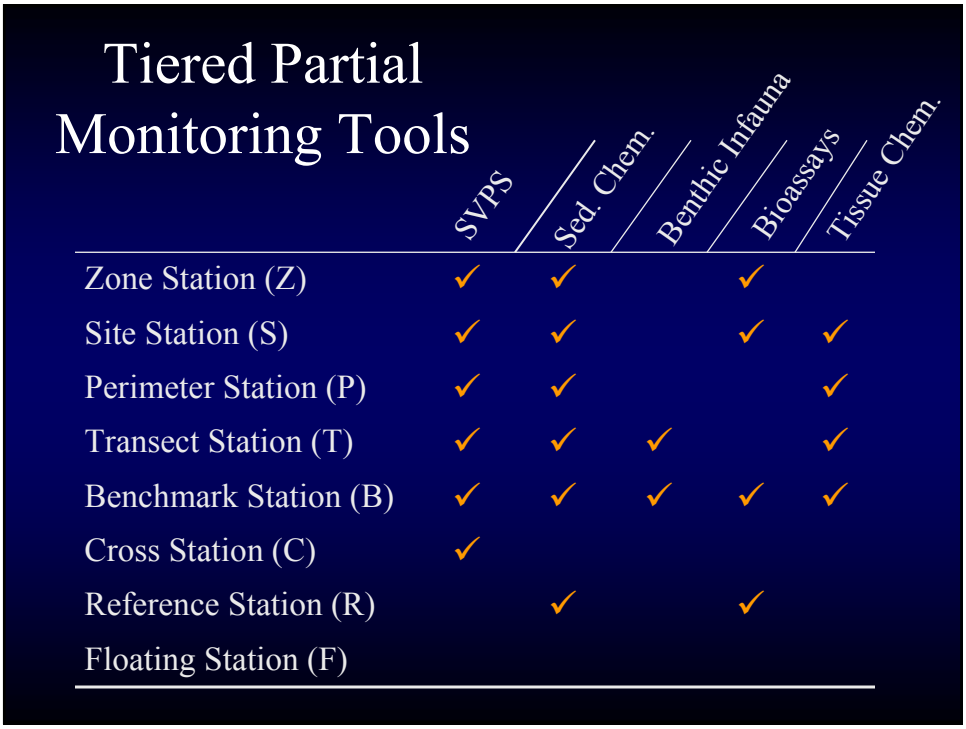


PP 3.5. Elliot Bay Disposal Site

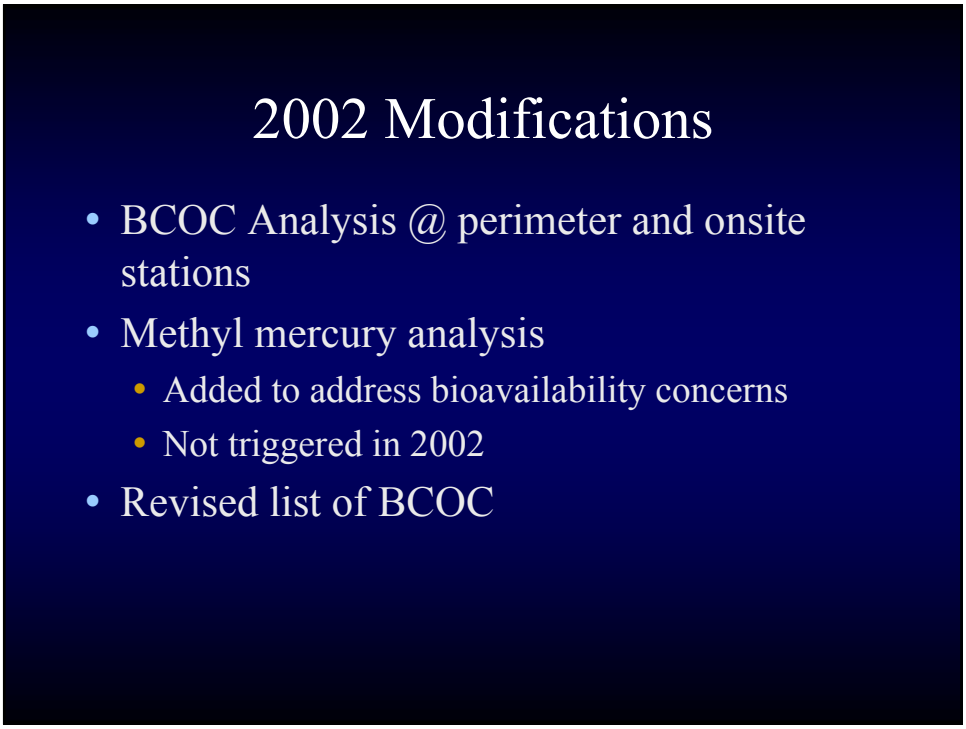
Monitoring Framework

1. Does dredged material remain on site?
   - Sediment Vertical Profile System (SVPS)
   - Sediment Chemistry
2. Were biological effects conditions exceeded?
   - Sediment Chemistry
   - Sediment Bioassays
3. Were adverse effects to off-site biological resources observed?
   - Tissue Chemistry
   - Infaunal Community Structure

PP 3.6. Monitoring Framework



PP 3.7. Tiered Partial Monitoring Tools



PP 3.8. 2002 Modifications

Summary of 1988 Baseline Conditions

- Characteristics consistent w/ multiple sources of contamination and environmental disturbance
- Relict DM present in South
- Several chemicals/metals exceeded SLs: HPAH, LPAH, PCBs, dibenzofuran, Sb, Cu, Pb, Hg, Ni, & Zn
- Hg exceeded ML
- No bioassays exceeded criteria
- Benthic infauna abundance varied spatially

PP 3.9. Summary of 1988 Baseline Conditions

Summary of 1990 “Partial”

- SVPS – All material remained on site
- On-site stations passed chem. & bioassay
- Some SL exceedances (P07, Z01) for Hg, Ag, Zn, phenol, HPAHs, indeno (1,2,3-c,d) pyrene, PCBs, and DDTs

PP 3.10. Summary of 1990 "Partial"

Summary of 1992 “Full”

- SVPS – Material remained on site
- On-site stations passed chem. & bioassay
- Some SL exceedances for Hg, Cu, Pb, Ag, HPAHs, indeno (1,2,3-c,d) pyrene, PCBs, and DDTs
- Metal and organic SL exceedances occurred among all station types
- No adverse biological effects offsite

PP 3.11. Summary of 1992 "Full"

Summary of 2000 “Full”

- SVPS – All material remained on site
- On-site stations passed chem. & bioassay
- Hg SL and SQS exceedance at S02
- No chemical concentration increase offsite
- No significant change in predominant species abundance

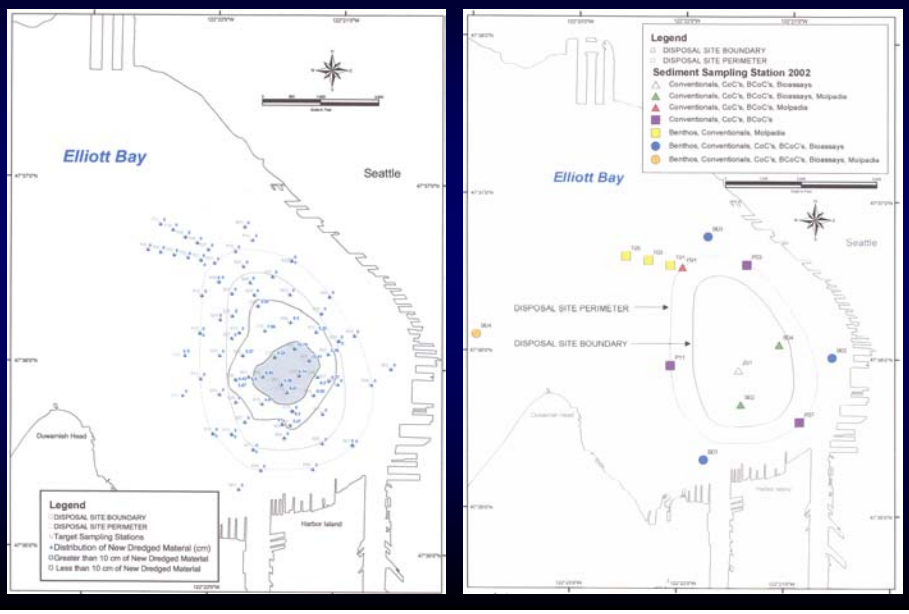
PP 3.12. Summary of 2000 "Full"

2002 Results

- SVPS
- Site Chemistry
- Site Bioassays
- Benthic Infauna
- Tissue Analyses
- Benchmark Stations

PP 3.13. 2002 Results

Sediment, Tissue, & SVPS

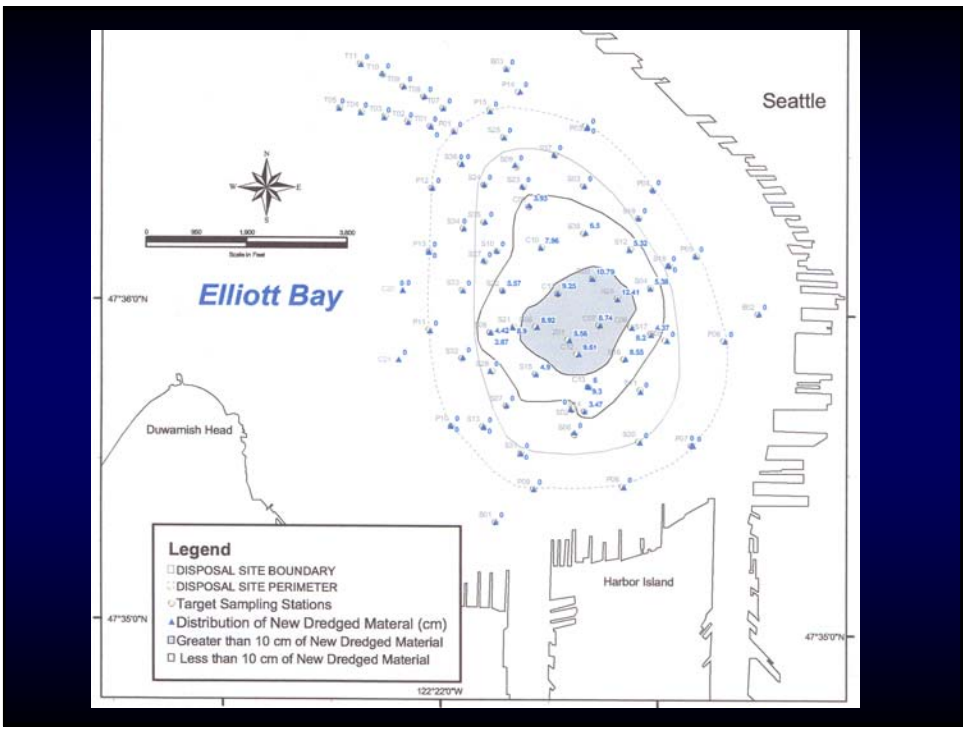


PP 3.14. Sediment, Tissue, & SVPS

Sediment Vertical Profile System (SVPS)

- Images obtained at 75 stations
- Recent dredged material entirely onsite
- Some older dredged material past eastern flank of disposal site (but within perimeter stations)
- PSDDA Hypothesis 1 is not rejected

PP 3.15. Sediment Vertical Profile System (SVPS)



PP 3.16. Untitled

Sediment Chemistry

- In comparison to 2000, sediments coarser on site, comparable @ perimeter, % fines increased at transect stations
- All metals except Antimony and Cadmium detected
- SL and SQS levels exceeded for Mercury, but no BT or ML exceedances.
- No organics exceeded ML, BT, or SQS values
- Field variability was acceptable (RSD < 50%), except for pyrene (P01, 03, & 07), fluoranthene (P01 & 07), chrysene (P03 & 07), benzofluoranthenes (P03 & 07), Aroclor 1260 (P03), and only at P07 phenanthrene, benz(a)anthracene, benzo(a)pyrene, indeno(1,2,3-c,d)pyrene, and benzo(g,h,i)perylene

PP 3.17. Sediment Chemistry

Tissue Chemistry

Molpadia samples from T stations analyzed for Mercury only

- Hg concentrations ranged from 0.130 to 0.300 mg/kg (dry weight)
- RSD < 50% except for T03, which suggests tissues for this station are naturally variable in terms of chemical composition

PP 3.18. Tissue Chemistry

Bioassays

All stations passed PSDDA bioassay guidelines

- Amphipod Mortality
  - No test sediments had mortality >20% over absolute mean negative control or 30% over absolute mean reference sediment response.
- Larval Mortality/Abnormality
  - Z01 scored a hit under two-hit rule, however exceedance was not confirmed by a second test
- Juvenile *Neanthes* Growth
  - All test samples passed

PP 3.19. Bioassays

Benthic Community Analysis

- Dominant species composition is similar to previous surveys, however proportional abundances are shifting among transect stations
- Benthic community structure grades from high polychaetes abundance to high crustaceans as distance increases from disposal site

PP 3.20. Benthic Community Analysis

Benchmark Station Analyses

- Decrease in dominant benthic infaunal species abundance down current from disposal site indicates possible trigger for analysis of benthic infaunal abundance

Evidence indicates large abundance shifts over time as part of a natural cycle of variable recruitment, interspecies competition, and predation

PP 3.21. Benchmark Station Analyses

Special Studies

- Bioaccumulative Contaminants of Concern Analysis of *Molpadia* and co-located sediment samples for new BCOC list

PP 3.22. Special Studies

Evaluation of 2001 Data

- Question 1: Does dredged material remain on-site?
  - Hypothesis 1: Dredged material remains within the site boundary
    - Not Rejected, based on SVPS Survey
  - Hypothesis 2: Chemical concentrations offsite do not increase due to disposal
    - Not Rejected, chemical concentrations did not measurably increase over time due to disposal

PP 3.23. Evaluation of 2001 Data

- Question 2: Has DM disposal caused bio. effects conditions to be exceeded?
  - Hypothesis 3: On-site chem. conc. don't exceed Site Cond. II guidelines
    - Not Rejected, no ML exceedances
  - Hypothesis 4: Sed. Toxicity doesn't exceed Site Condition II guidelines
    - Not Rejected, all 3 onsite stations passed bioassay interpretive guidelines

PP 3.24 Evaluation of 2001 Data (continued)

- Question 3: Are unacceptable adverse effects occurring off-site due to disposal?
  - Hypothesis 5: No sig. increase in chemical body burden of benthic infaunal taxa
    - Not Rejected, no significant change in Hg concentrations
  - Hypothesis 6: No sig. decrease in abundance of dominant benthic infaunal taxa
    - Tentatively Not Rejected, decrease in dominant infaunal species abundance down current of disposal site understood as natural fluctuation

PP 3.25. Evaluation of 2001 Data (continued)

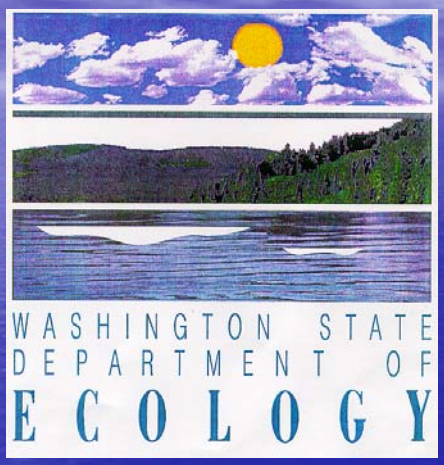
Future Monitoring at Elliot Bay

Future monitoring will occur when DMMP agencies determine that volume trigger has been met.

PP 3.26. Future Monitoring at Elliot Bay

PP 3.27. Puget Sound Site Reports

Sediment Management Standards



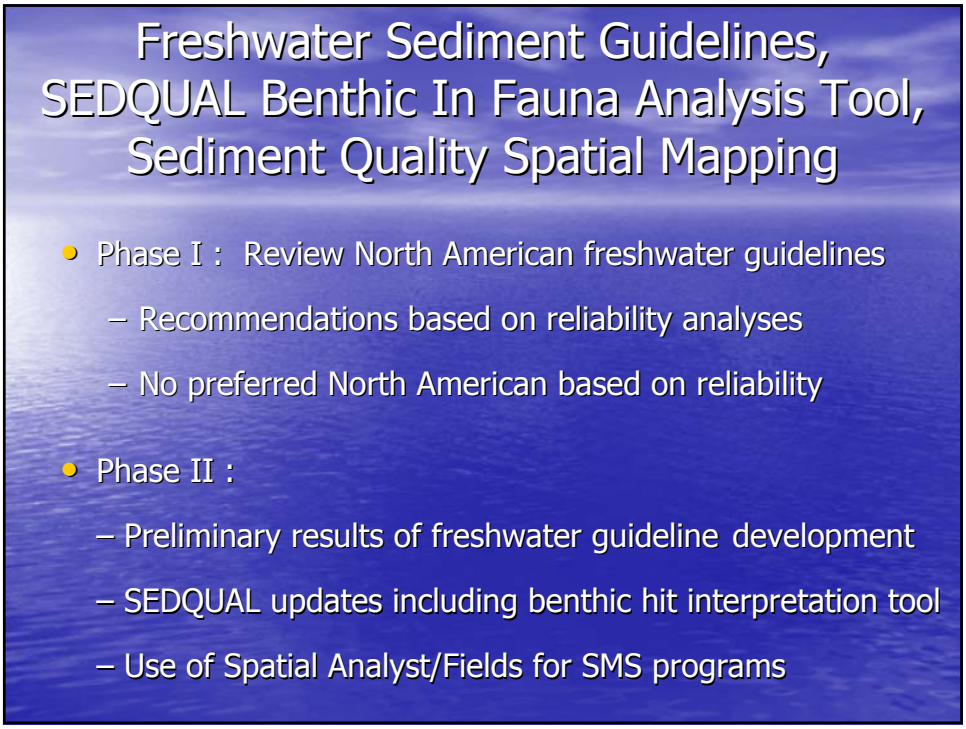
Toxics Cleanup Program
Sediment Management Unit

PP 4.1. Sediment Management Standards

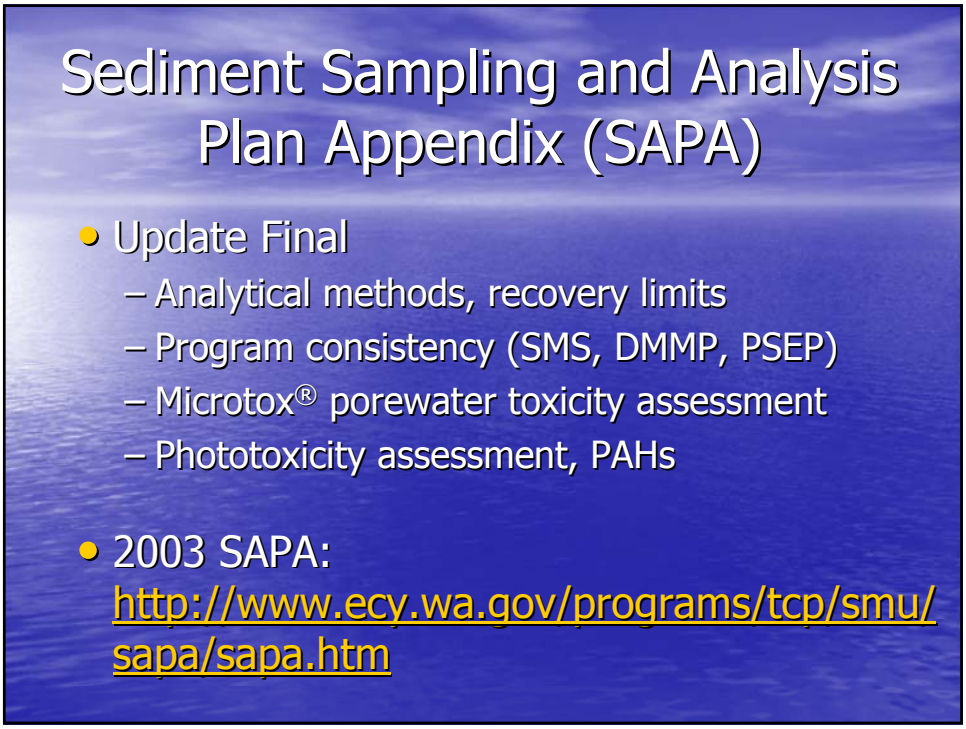
Chapter 173-204-120 WAC Antidegradation Policy

- The antidegradation policy of the state of Washington is applicable to any person's new or increased activity.
- Despite this, the Sediment Management Unit was able to hire Ted Benson, formerly with the Department of Natural Resources.
- Ted will be working on Federal Facilities and NRDA.

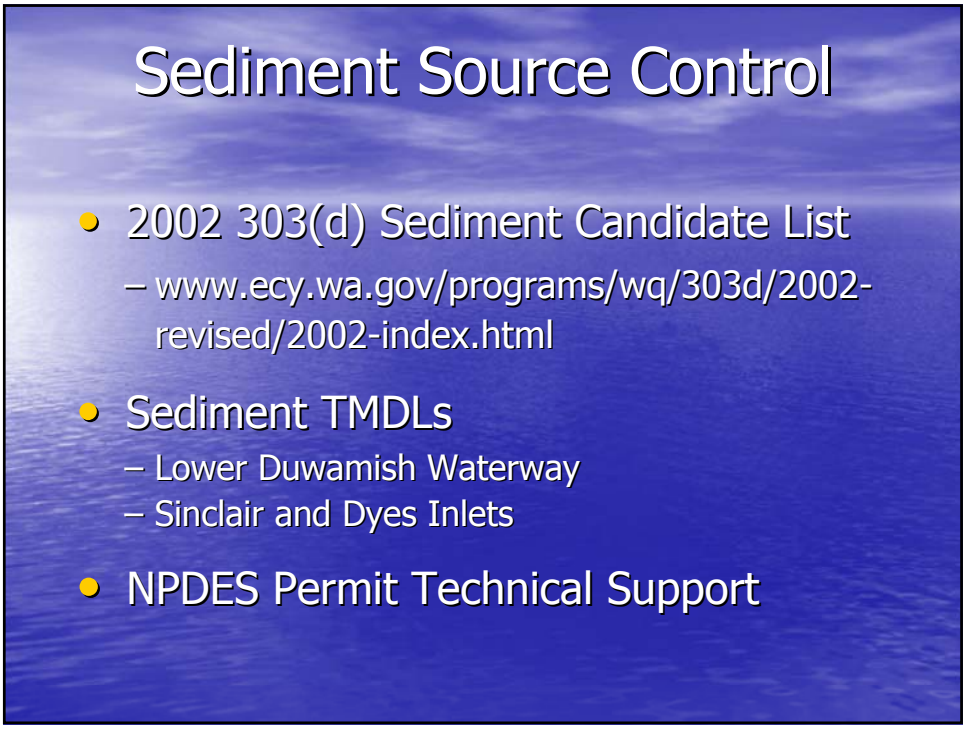
PP 4.2. Chapter 173-204-120 WAC Antidegredation Policy



PP 4.3. Freshwater Sediment Guidelines, SEDQUAL Benthic In Fauna Analysis Tool, Sediment Quality Spatial Mapping

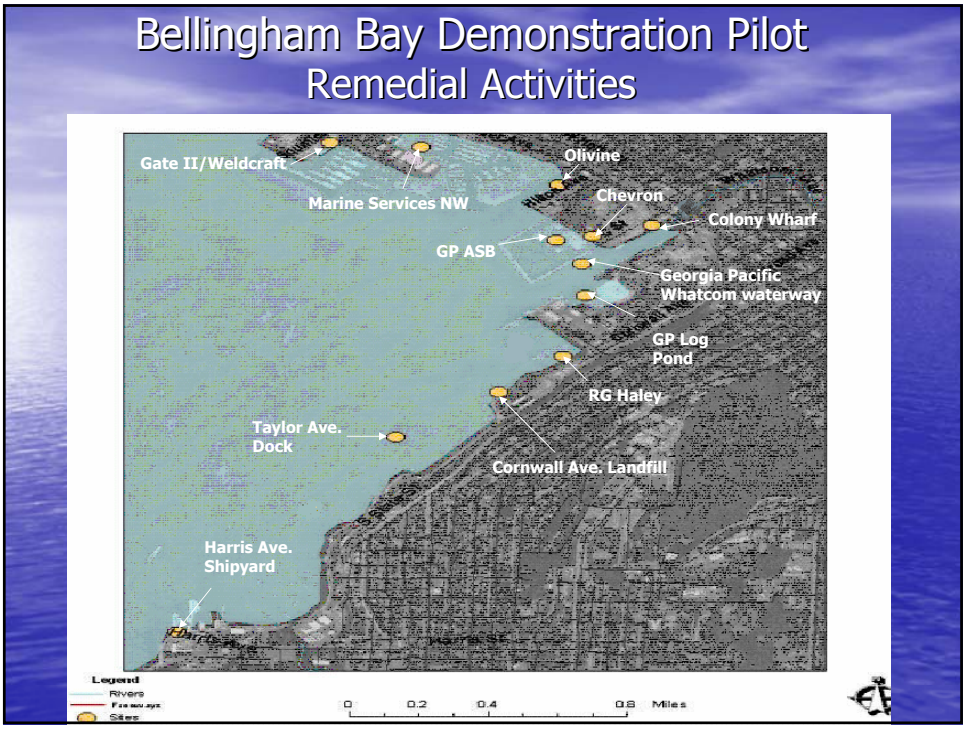


PP 4.4. Sediment Sampling and Analysis Plan Appendix (SAPA)



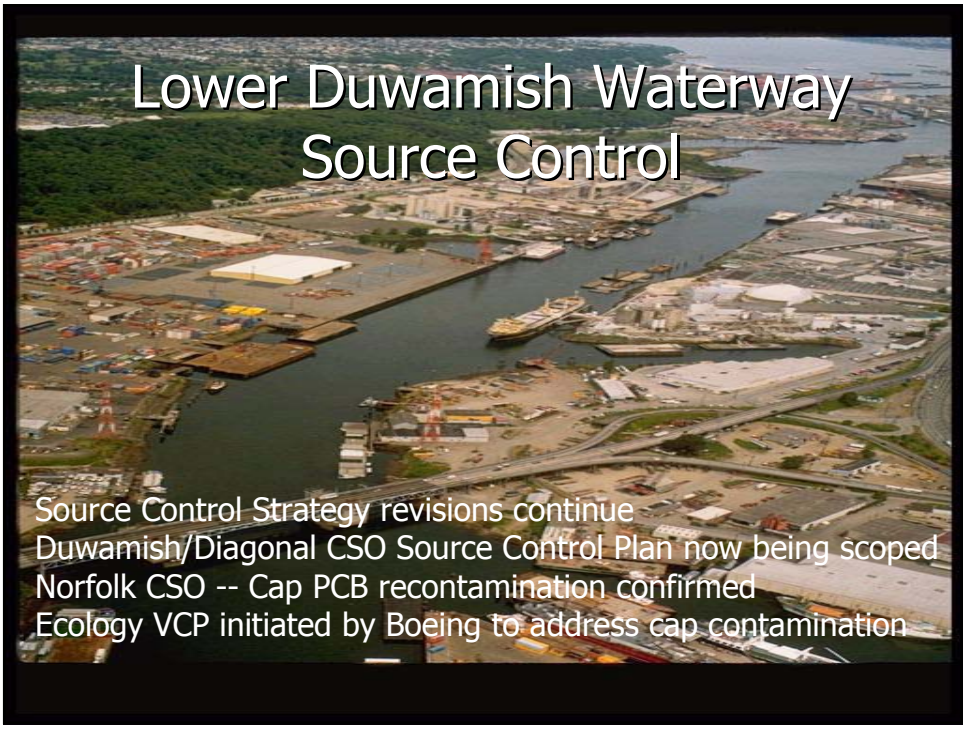
PP 4.5. Sediment Source Control

PP 4.6. some...Sediment Site Status



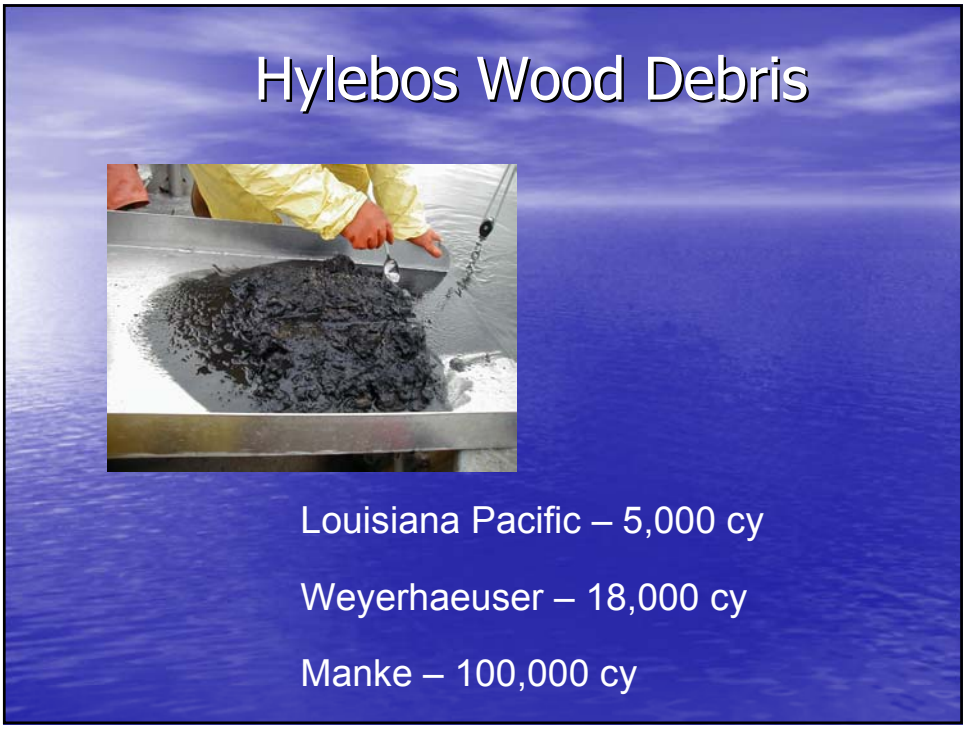
PP 4.7. Bellingham Bay Demonstration Pilot Remedial Activities

PP 4.8. Whatcom Waterway



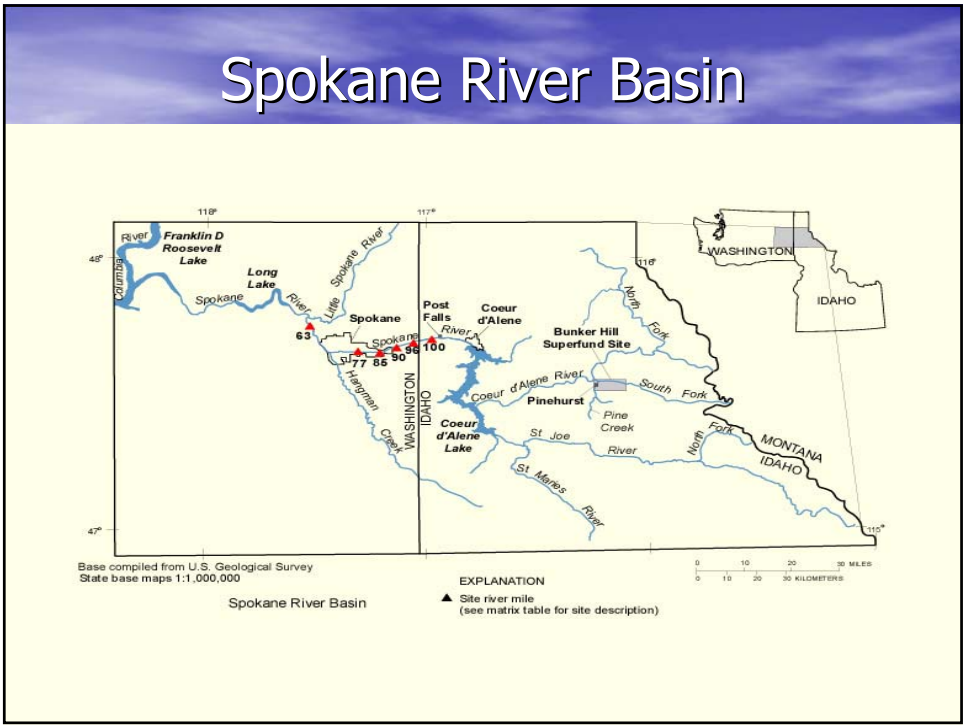
PP 4.9. Lower Duwamish Waterway Source Control

PP 4.10. Cascade Pole, Olympia

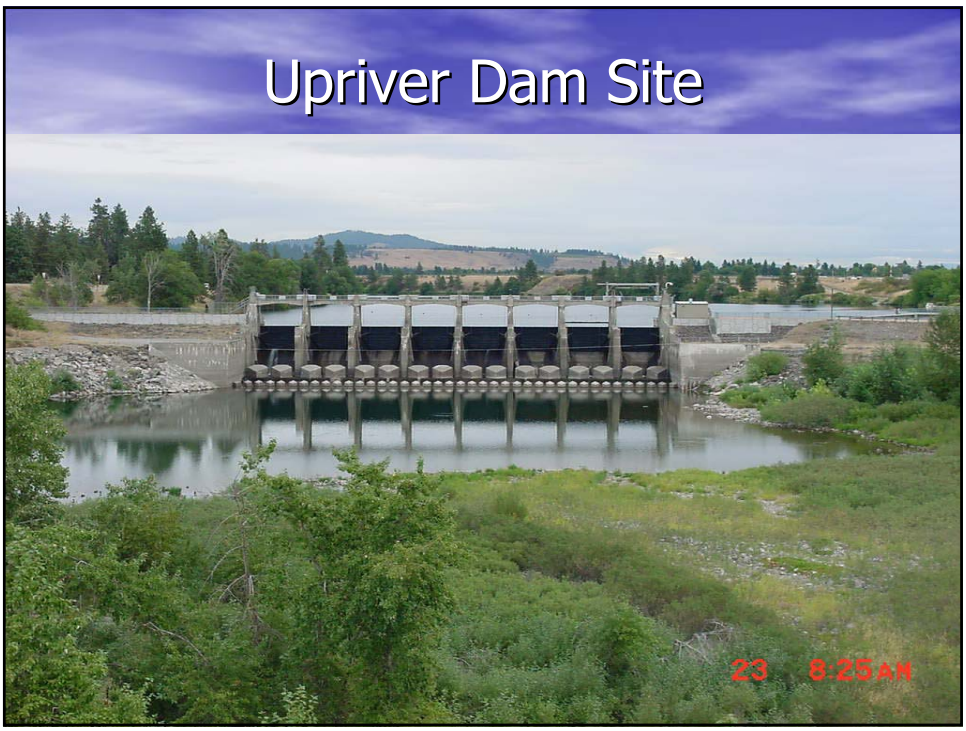


PP 4.11. Hylebos Wood Debris

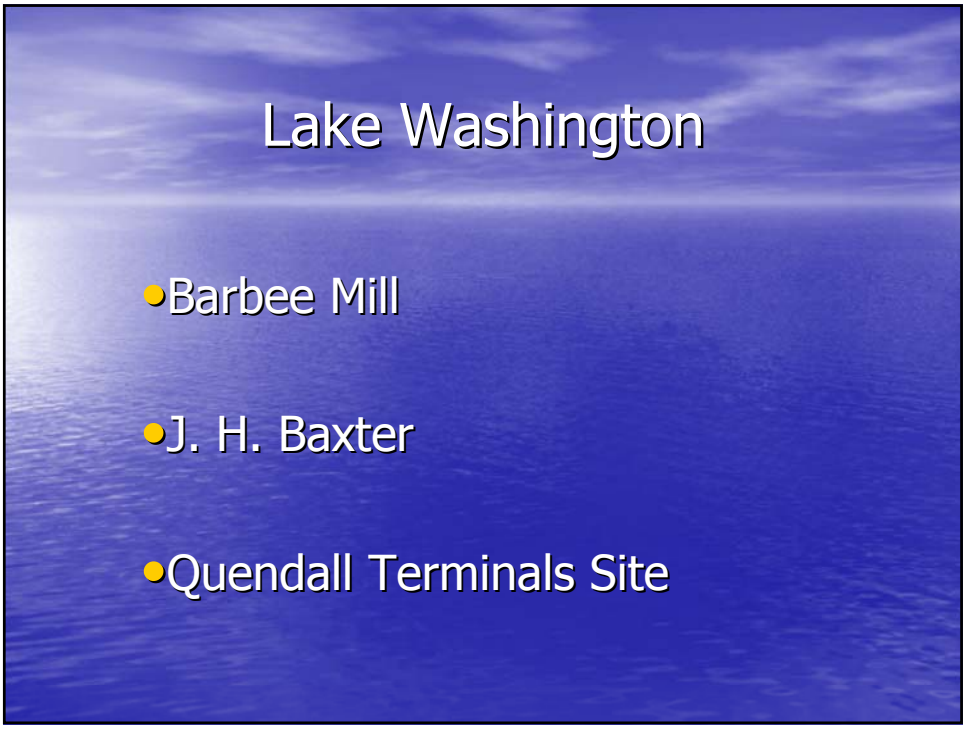
PP 4.12. Puget Sound Naval Shipyard and Jackson Park Housing Complex



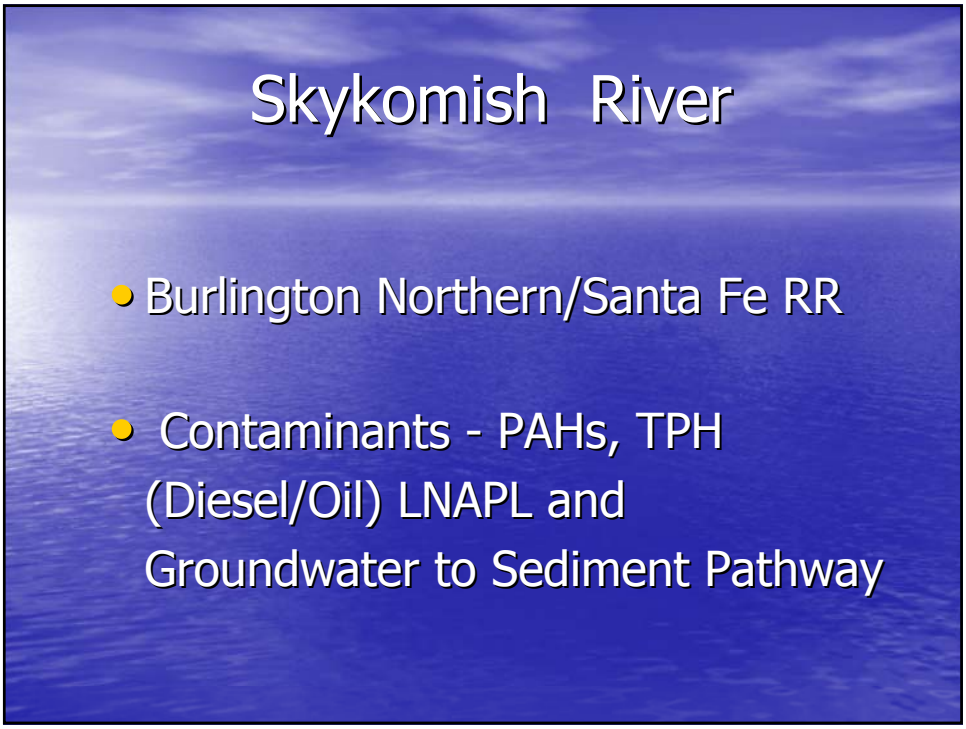
PP 4.13. Spokane River Basin



PP 4.14. Upriver Dam Site



PP 4.15. Lake Washington



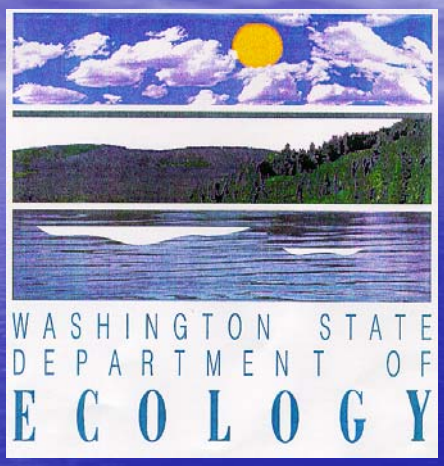
PP 4.16. Skykomish River

More Web Sites. . .

- SEDQUAL data entry templates: http://www.ecy.wa.gov/programs/tcp/smu/sedqual/sedqualtemplates.htm
- PSEP protocols (page 1 of SAPA Section 1): http://www.wa.gov/puget_sound/Publications/protocols/protocol.html
- DMMP prototype SAP (page 11 of SAPA Section 1): http://www.nws.usace.army.mil/PublicMenu/Menu.cfm?sitename=dmmo&pagename=Useful_Stuff
- SW-846 and updates (page 24 of SAPA Section 2): http://www.epa.gov/epaoswer/hazwaste/test/sw846.htm

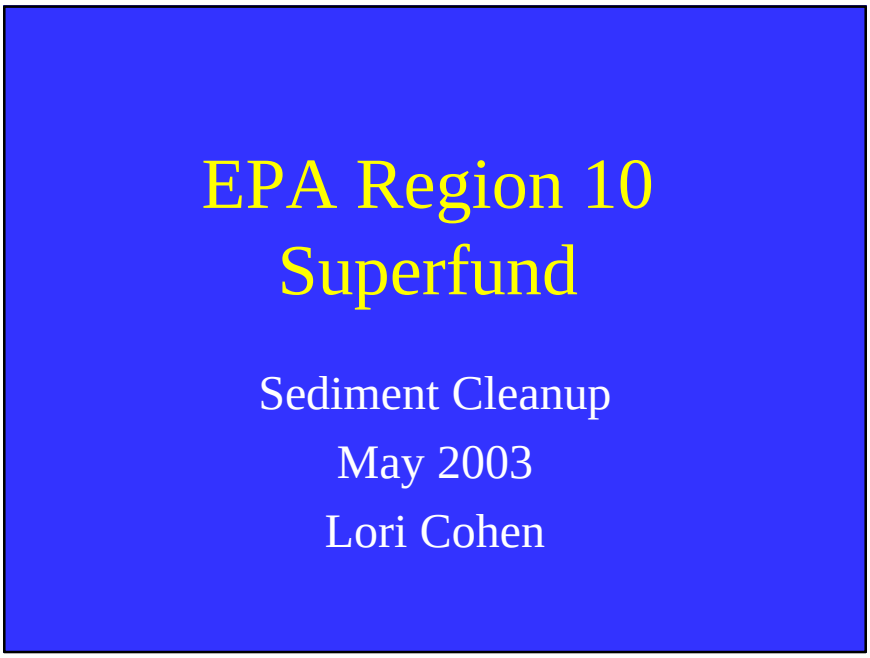
PP 4.17. More Web Sites...

Sediment Management Standards

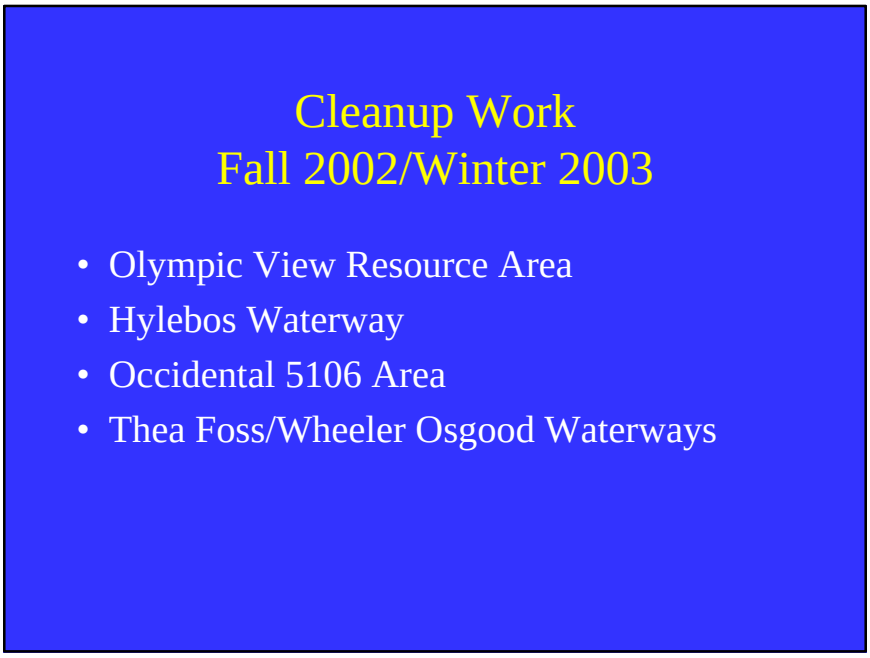


Toxics Cleanup Program
Sediment Management Unit

PP 4.18. Sediment Management Standards



PP 5.1. EPA Region 10 Superfund Sediment Cleanup



PP 5.2. Cleanup Work Fall 2002/Winter 2003

Olympic View Resource Area

Dioxins, Metals, PCBs

- Construction completed October 2002
- Excavated 10,500 tons sediment
- Removed 1,260 tons debris and pilings
- Capped 1.3 ac (intertidal and subtidal)
- Completed native plantings
- Trustee/City habitat restoration project

PP 5.3. Olympic View Resource Area (Dioxins, Metals, PCBs)

PP 5.4. Olympic View Resource Area During Site Excavation

PP 5.5. Olympic View Resource Area After Cleanup

Hylebos -- 2002 Actions

- Pier demolition
- Slip 5 habitat -- “Phase I”
- Blair Slip 1 containment berm

PP 5.6. Hylebos--2002 Actions

Area 5106 Removal Action at Occidental Chemical Site

- Removal of 32,000 cubic yards of sediment
  - October 2002 through January 2003
  - Suction dredge under rigorous monitoring
- Thermally treated solids disposed in Slip 1

PP 5.7. Area 5106 Removal Action at Occidental Chemical Site

PP 5.8. Toyo Submersible Dredge Pump (Submerged)

PP 5.9. Toyo Submersible Dredge Pump

PP 5.10. Toyo Submersible Dredge Pump cont.

PP 5.11. Area 5106 Treatment Plant

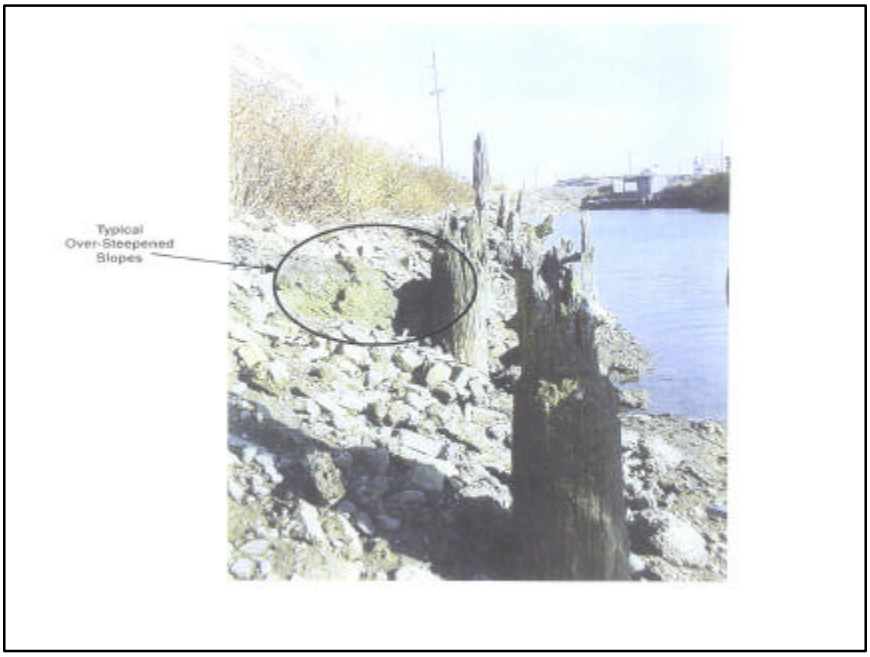
PP 5.12. Storage of Area 5106 Treated Sediment Prior to Disposal to Slip 1

Thea Foss & Wheeler-Osgood 2002 Actions

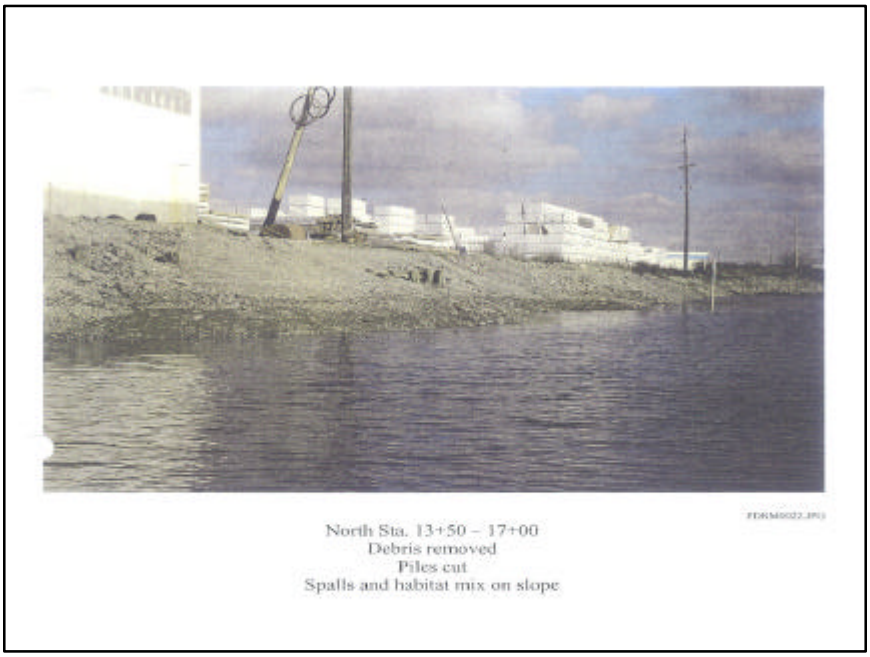
- EPA Issued a UAO on September 30, 2002, for six (6) actions:
  - Capping RA 1A and 1B at the Mouth of the Thea Foss
  - Capping Totem Marine Services shoreline
  - Installing a sheetpile bulkhead at Johnny's Seafood
  - Bank restoration in 20% of Wheeler-Osgood Waterway
  - Debris removal and capping under Martinac Pier
  - Pile removal on DNR land in Mouth of Middle/St.Paul Waterways

PP 5.13. Thea Foss & Wheeler Osgood 2002 Actions

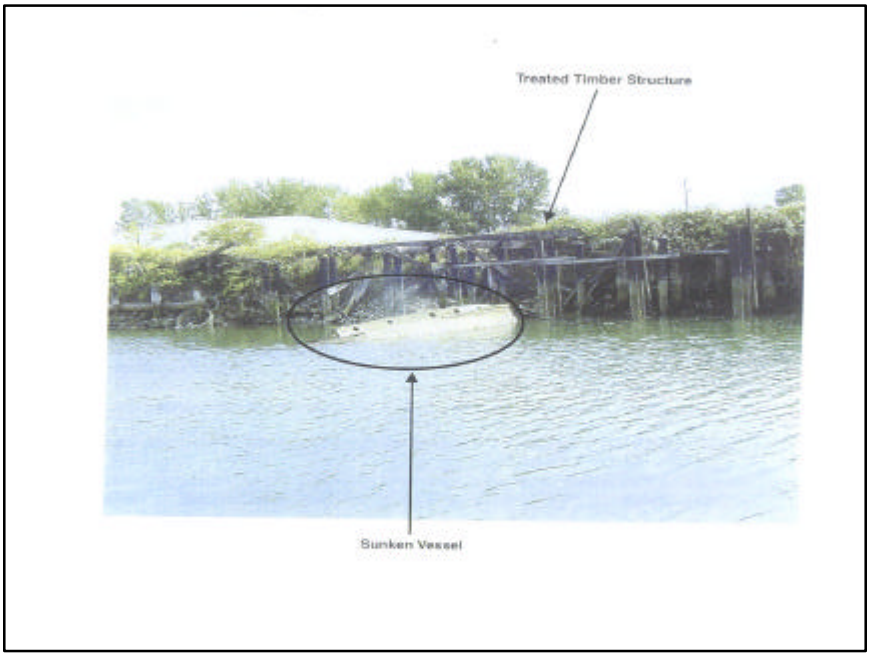
PP 5.14. North Shore Thea Foss Waterway Prior to Bank Cleanup



PP 5.15. North Shore Thea Foss Waterway Prior to Bank Cleanup cont.



PP 5.16. North Shore Thea Foss Waterway After Bank Cleanup



PP 5.17. South Shore Thea Foss Waterway Prior to Bank Cleanup

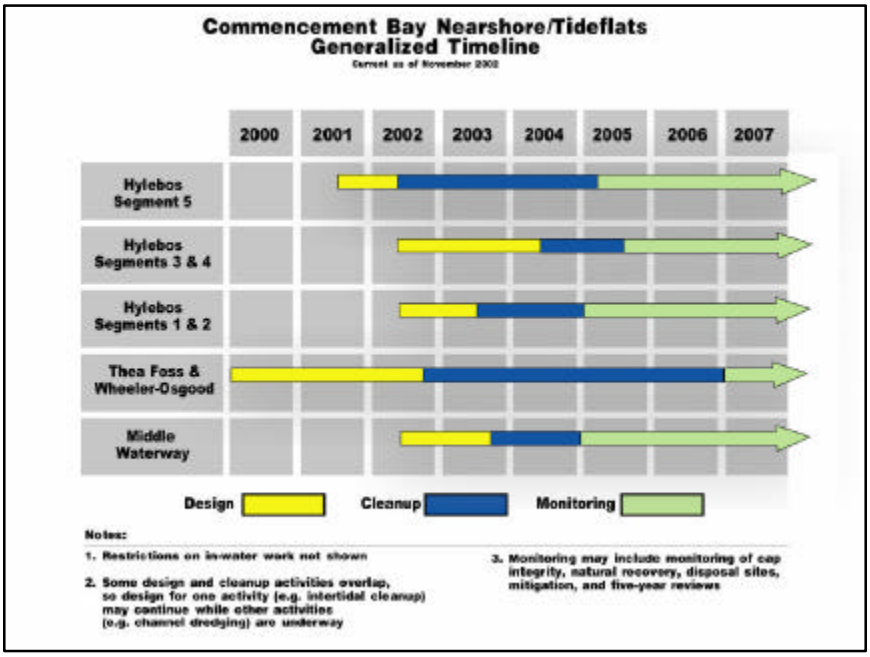
PP 5.18 South Shore Thea Foss Waterway After Bank Cleanup

PP 5.19. Sheetpile Wall Installed Along Johnnie's Seafood

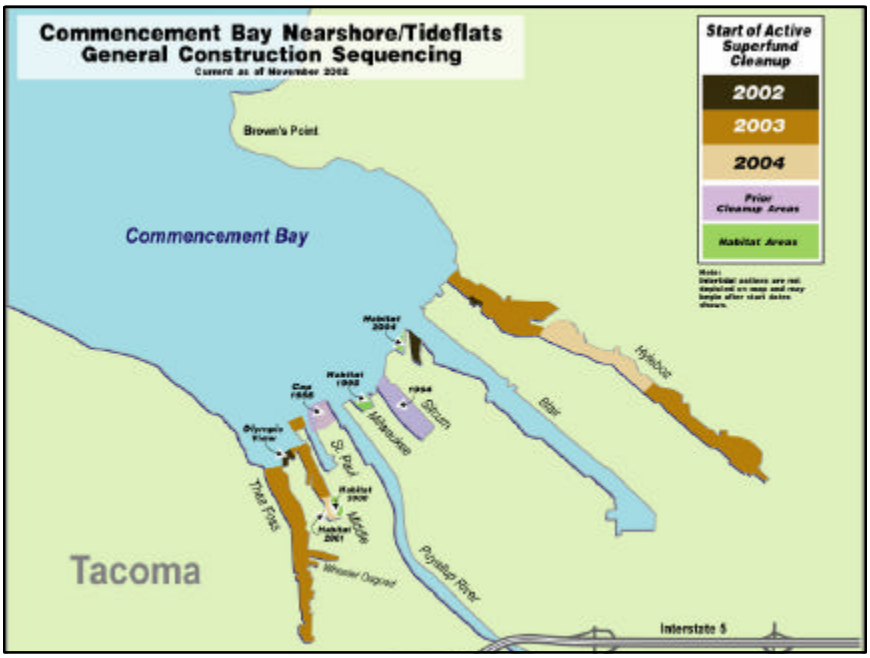
Commencement Bay

- March 2003
- All Source Control Milestones Met
- Sediment Remedial Actions Can Proceed

PP 5.20. Commencement Bay

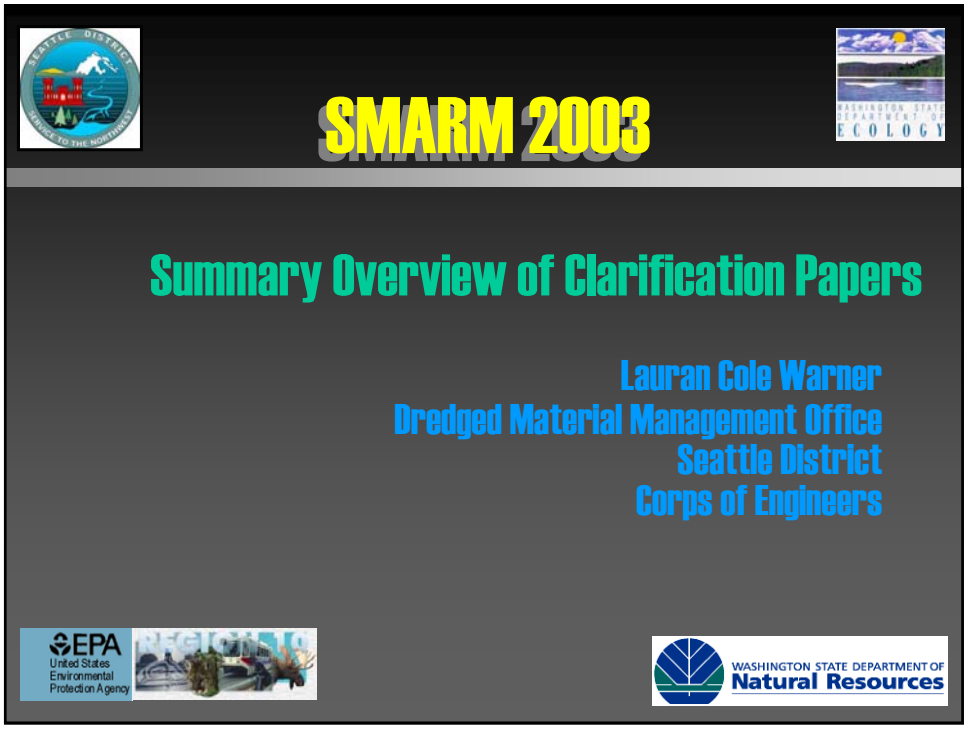


PP 5.21. Commencement Bay Nearshore/Tideflats Generalized Timeline



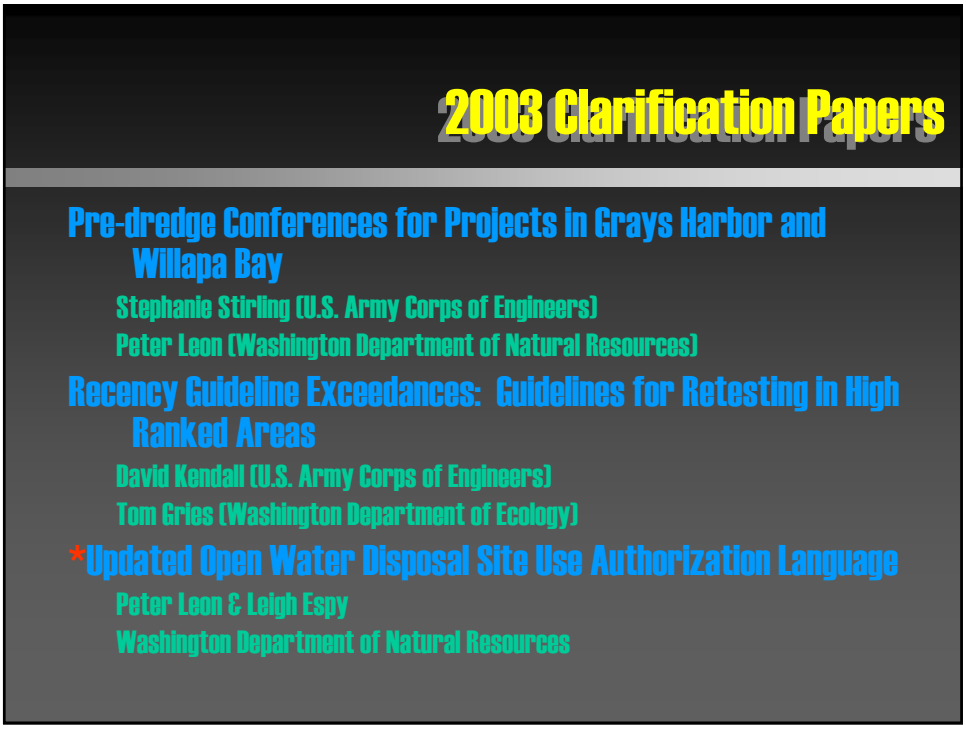
PP 5.22. Commencement Bay Nearshore/Tideflats General Construction Sequencing

PP 5.23. Cleanup Work Planned for 2003/2004

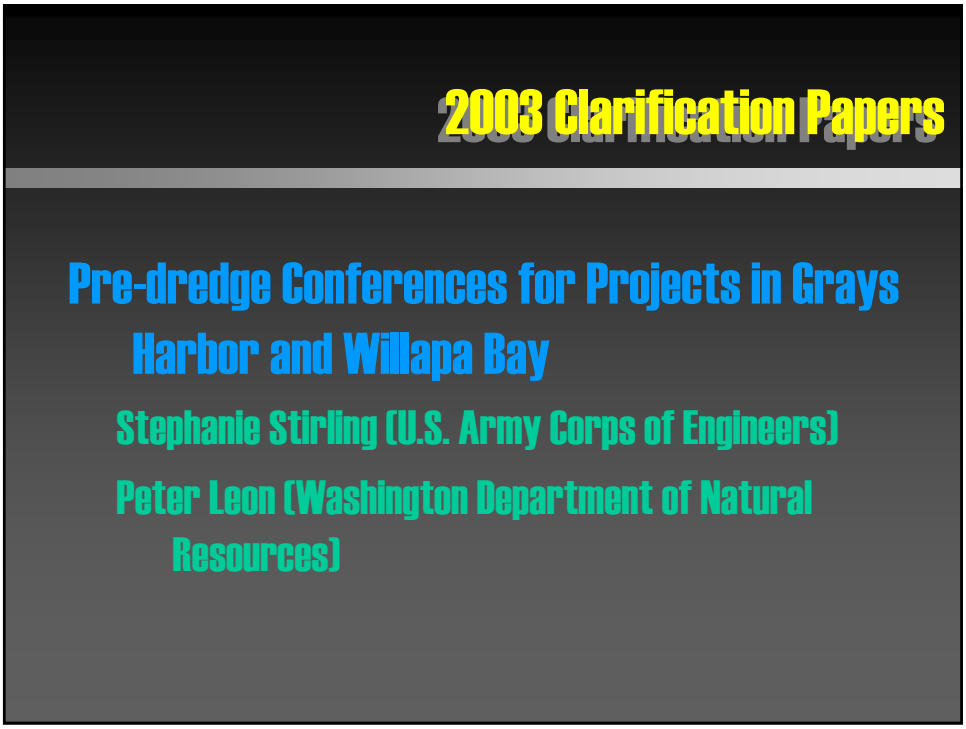


PP 6.1. Summary Overview of Clarification Papers

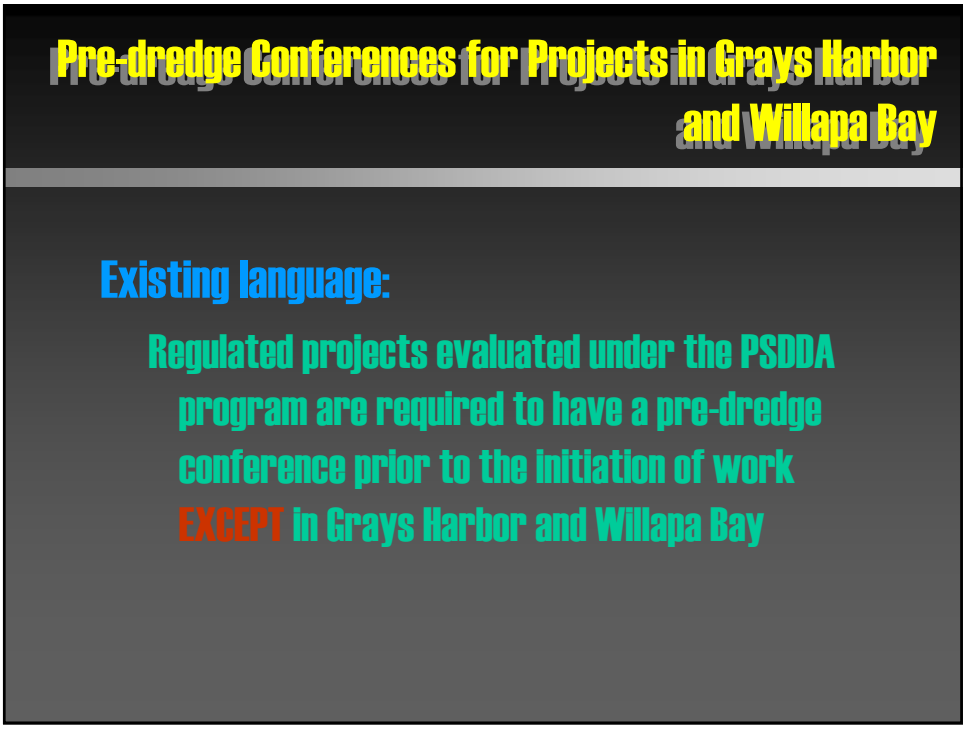
PP 6.2. Good Morning



PP 6.3. 2003 Clarification Papers



PP 6.4. Pre-Dredge Conferences for Projects in Grays Harbor and Willapa Bay



PP 6.5 Pre-dredge Conferences for Projects in Grays Harbor and Willapa Bay

PP 6.6. Pre-dredge Conferences for Projects in Grays Harbor and Willapa Bay (continued)

PP 6.7. Washaway Beach in Willapa Bay

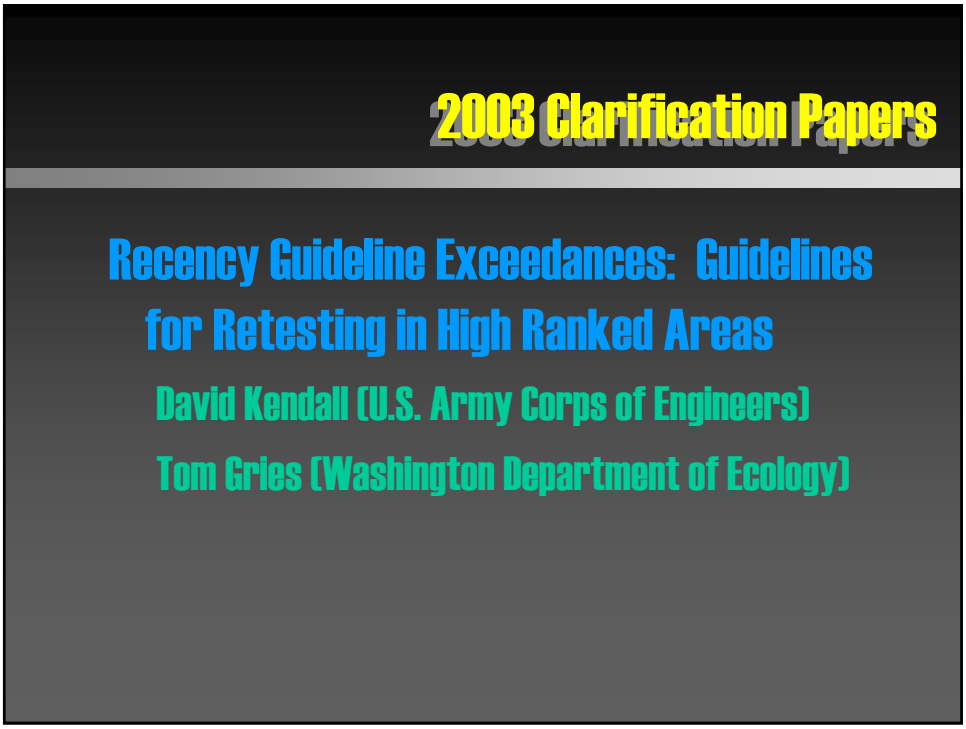
Pre-dredge Conferences for Projects in Grays Harbor and Willapa Bay

Clarification:

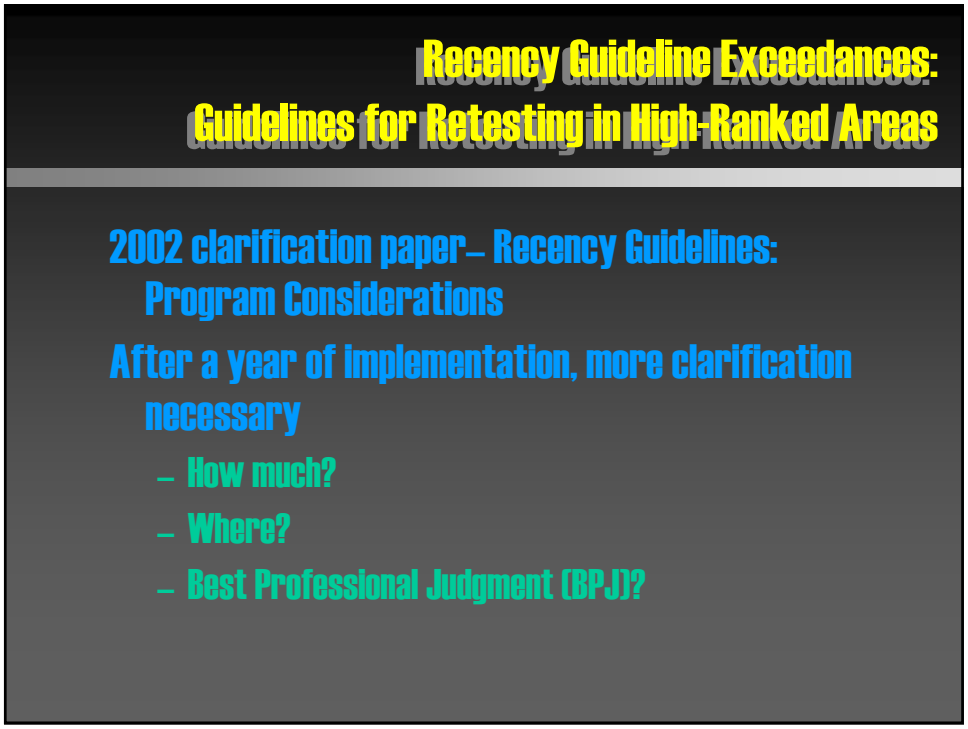
- Pre-dredge conference really IS needed
- Due to logistics, this requirement can be implemented as a conference call
- To be coordinated between applicant, Corps regulatory, and DMMP reps
- Discuss: disposal locations, WQC, dredging QC plan; DNR site use authorization

PP 6.8. Pre-dredge Conferences for Projects in Grays Harbor and Willapa Bay

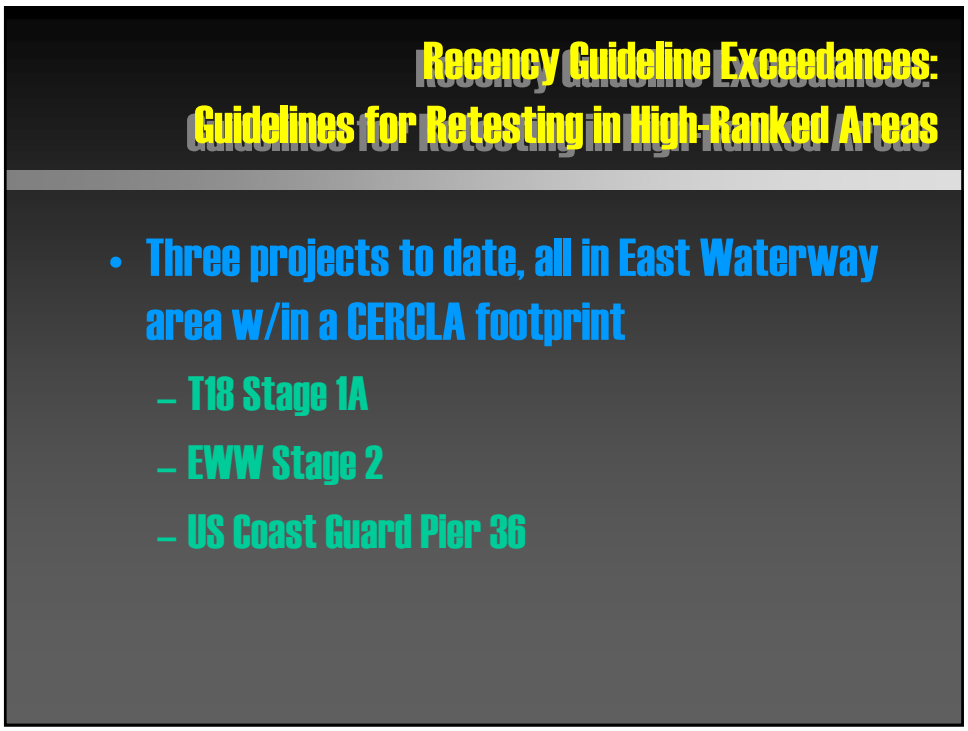
PP 6.9. Untitled Photo



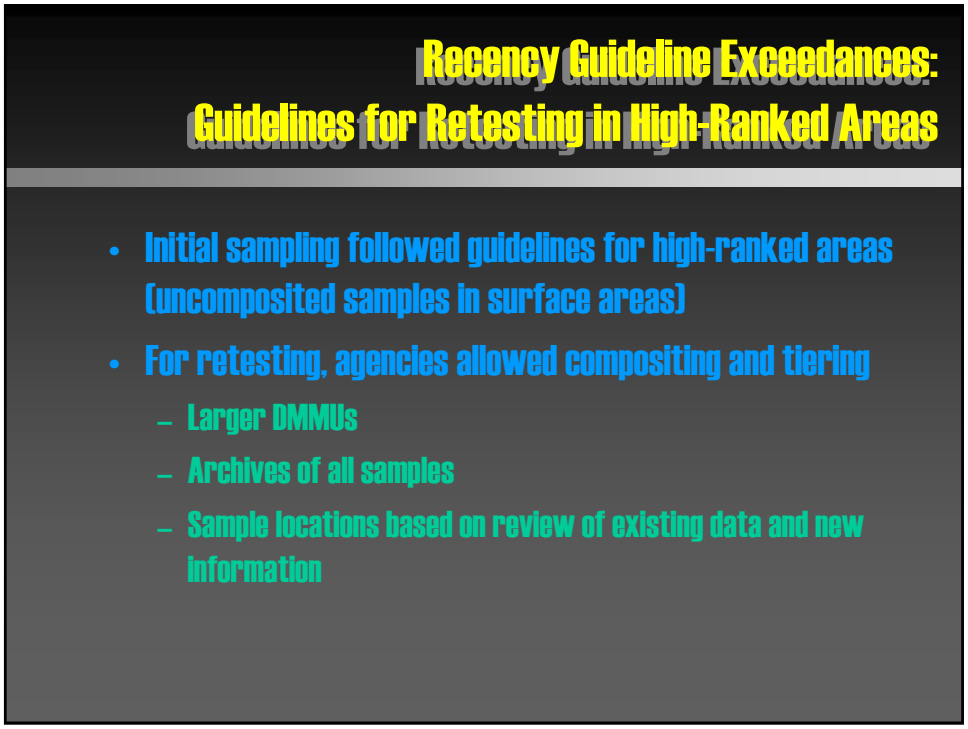
PP 6.10. Recency Guideline Exceedances: Guideline for Retesing in High Ranked Areas.



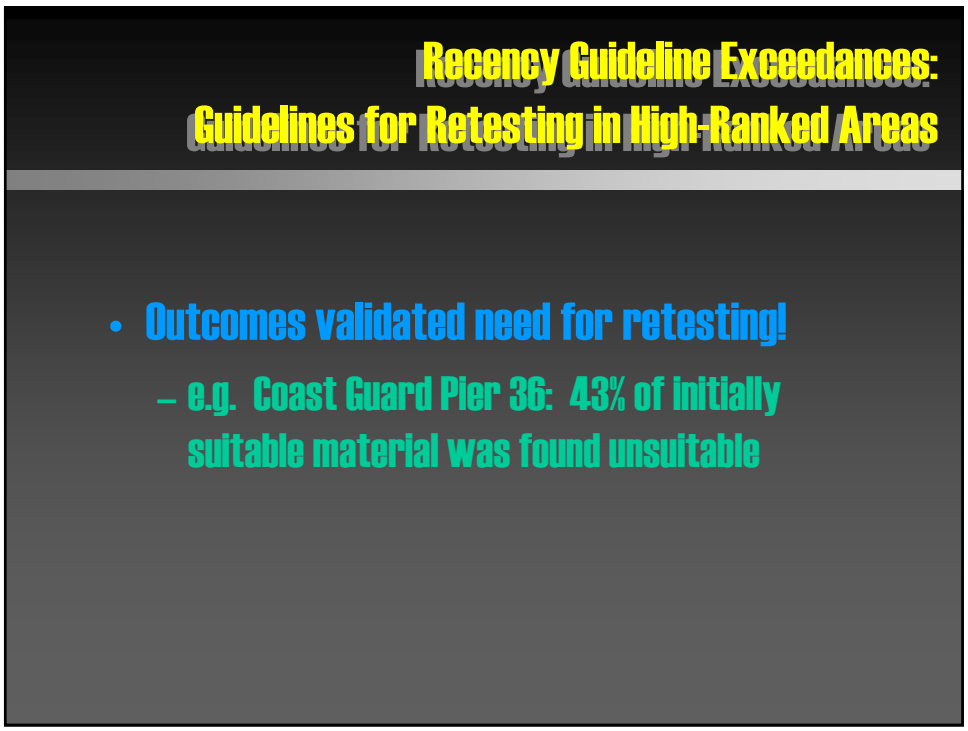
PP 6.11. Recency Guideline Exceedances: Guidelines for Retesting in High-Ranked Areas



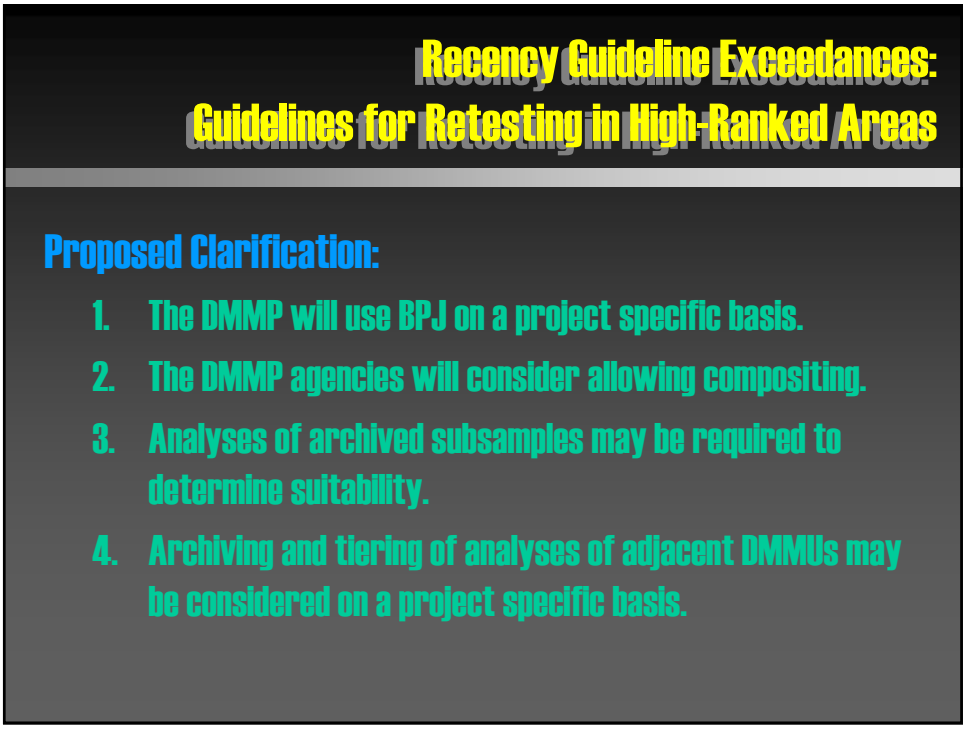
PP 6.12. Recency Guideline Exceedances: Guidelines for Retesting in High-Ranking Areas



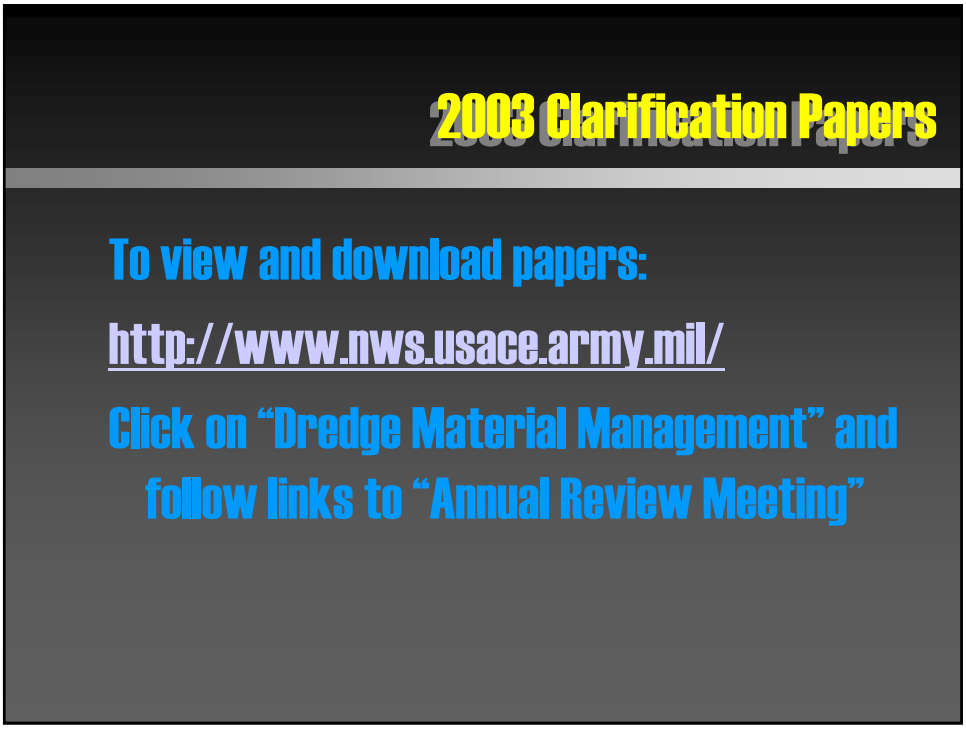
PP 6.13. Recency Guideline Exceedances: Guidelines for Retesting in High-Ranked Areas (continued)



PP 6.14. Recency Guideline Exceedances: Guidelines for Retesting in High-Ranked Areas (continued)



PP 6.15. Recency Guideline Exceedances: Guidelines for Retesting in High-Ranked Areas (continued)



PP 6.16. 2003 Clarification Papers

PP 6.17. 2003 Clarification Papers (continued)

PP 6.18. Untitled

Proposed Fee Increase for Open Water Dredged Material Disposal Site Use

Loren Stern
DNR Aquatic Resources Division Manager

PP 7.1. Proposed Fee Increase for Open Water Dredged Material Disposal Site Use

Purpose

To increase the user fee for open-water disposal sites within Puget Sound and Coastal Washington in accordance with RCW 79.90.560

PP 7.2. Purpose

Governing Statutes & Rules

- RCW 79.90.560 – The DNR shall, from time to time, estimate the costs of site mgmt & environmental monitoring at aquatic land dredged material disposal sites and may, by rule, establish fees for use of such sites in amounts not greater than necessary to cover the estimated costs.

PP 7.3. Governing Statutes & Rules

- WAC 332-30-166 –

(9)…FEES

(a) Puget Sound and Strait of Juan de Fuca: All disposal sites $0.45 per cubic yard, $2000 minimum

(b) Grays Harbor/Willapa Bay: All disposal sites $0.10 per cubic yard, minimum fee $300

PP 7.4. Governing Statutes & Rules (continued)

History

- 1988 – PSDDA Program instituted
  - Disposal Fee - $0.40 per cy
  - Monitoring
    - Trigger 100,000 cy
    - Cost ~$120,000/$60,000
- 1995 – DMMP supersedes PSDDA
  - Disposal Fee – Increased to $0.45 per cy
  - Monitoring
    - Trigger 300,000 cy (1996)
    - Cost ~$140,000/$96,000

PP 7.5. History

- 2001 – 2002
  - Trigger – 2002 increase to 500,000 cy in Central Puget Sound
  - Costs
    - Full – (2001 Comm. Bay) $289,056 (excluded BCOC)
    - Partial – (2002 Elliott Bay) $209,487 (inc. BCOC)
- Future – Add ~$65,000 to cost of full for BCOC analyses, a new programmatic DMMP requirement.
  - Full - $354,056
  - Partial - $191,879

Average - $272,968

PP 7.6. History (continued)

Facts

- Between 1988 and 2003, monitoring cost will have nearly tripled
  - From ~$120,000 to ~$354,000
  - Average is ~$273,000
- Monitoring trigger has increased more than 10-fold
  - From 45,000 cy to 500,000 cy
  - Direct result of effective management and evidence of environmental protection

PP 7.7. Facts

- Upland Landfill Tipping Fees (per DOE website)
  - Range from $19 to $97 per ton, or $28 to $145 per cubic yard, excluding transportation costs
- At an average cost of $272,968 per monitoring event, disposal fee will have to be $0.546 ($0.55) per cy to cover the cost of monitoring alone

PP 7.8. Facts (continued)

Disposal Site	Fee
Upland	$28.00 per cy
Open Water	$ 0.55 per cy
Savings	$27.45 per cy

PP 7.9. Facts (continued)

Average Trigger Volume

Disposal Site	**Trigger Volume**
Anderson/Ketron	300,000
Bellingham Bay	300,000
Commencement Bay	500,000
Elliott Bay	500,000
Port Gardner	500,000
	420,000

PP 7.10. Average Trigger Volume

Required Fee: Avg. Calculation

Avg Monitoring Cost	$272,968
Avg Trigger Volume (cy)	420,000
Required Fee	$0.6499

PP 7.11. Required Fee: Avg. Calculation

Management Costs & Benefits

- Special Studies Nearly $400,000
  - Benefit – TBT analysis costs eliminated in most sediment characterizations
- Management $94,683 annually
  - Benefit – Trigger volume increases, environmental protection, continued access to cheap disposal close to project area (reduces transportation costs)
- Shoreline Permits ~$25,000
  - Benefit – continued access to disposal sites

PP 7.12. Management Costs & Benefits

How are costs kept down?

- Increased trigger volumes reduce frequency of monitoring
- Coordination of Beneficial Use opportunities reduces disposed volume, thereby reducing monitoring frequency

PP 7.13. How are costs kept down?

Results of No Fee Increase

- DMMP within DNR will be significantly reduced or cease to exist
- Non-dispersive open-water disposal sites on SOALs will no longer be available to the dredging community
- All dredged material will have to go upland or out to EPA-approved ocean disposal sites
  - $28 to $145 per cy disposal fee upland
  - $1 per cy per mile transport cost to ocean disposal

PP 7.14. Results of No Fee Increase

Dredging Location	Transport Costs ($1/cy)	
	Ocean Disposal	DMMP Site
Comm. Bay	$160	$ 3
Elliott Bay	$140	$1.50
Everett	$130	$ 2
Bellingham	$120	$1 / $17
Skagit County	$105	$15
Port Townsend	$95	$12
Port Angeles	$65	$ 5
Aberdeen (G.H.)	$20	$14
Willapa Bay	$10	$ 5

PP 7.15. Results of No Fee Increase (continued)

What happens next?

- Wait for Legislature to pass a budget
- Formulate a formal proposal for rule making
- Initiate rule making process, includes
  - Target fee increase amount
  - Draft language
  - Public hearings
  - Presentation to the Board of Natural Resources
- Update SUA to reflect new fee

PP 7.16. What happens next?

Final Revisions to the DMMP's Bioaccumulative Contaminant of Concern List

Erika Hoffman
EPA

PP 8.1. Final Revisions to the DMMP's Bioaccumulative Contaminant of Concern List

Why revise the list?

- **Improves transparency and consistency**
- **Incorporates regional monitoring data**
- **Updates human- and ecotoxicological information**
- **Considers additional chemicals**
- **Establishes a process for future revisions**

PP 8.2. Why revise the list?

The Revision Process

- **1998 Technical Support Document and Issue Paper at SMARM**
- **1999/2002 BWG Meetings**
- **2001/2 Data compilation and draft lists**
- **2003 Revisions and final lists**

PP 8.3. The Revision Process

Issues Raised: Draft Lists

- Evaluate Log Kow thresholds
- How much data is enough?
- Provide more guidance on analytical methods
- What does List 4 mean?
- Provide more details on distributions of contaminants in tissues

PP 8.4. Issues Raised: Draft List

List 1: Primary BCOCs

- **9 Chemicals from the first draft list removed**
  6 Organochlorine pesticides
  3 PAHs
- **Used only detected concentrations to derive 95th percentile tissue concs.**

PP 8.5. List 1: Primary BCOCs

List 1: Primary BCOCs

- **Added 8 chemicals**
  6 trace metals (Cd, Cr, Cu, Pb, Se, Zn)
  1 PAH (pyrene)
  1 OC-pesticide (alpha-HCH)
- **Removed 19 chemicals**
- **12 chemicals unchanged**

PP 8.6. List 1: Primary BCOCs (continued)

List 1: Primary BCOCs

Implications for sediment analysis:

- **Developed interim BTs for 8 new chemicals**
  70% of the difference between ML and SL value
  Best Professional Judgement
- **Se, Cr, Alpha-BHC added to DMMP COC list.**
- **Negligible analytical cost associated with new chemicals.**

PP 8.7. List 1: Primary BCOCs (continued)

List 1: Primary BCOCs

Implications for tissue analysis:

- **Analysis costs for individual trace metals are**

low ($15 ea).

- **Analysis cost for alpha-BHC no different than existing M8081 pesticides**.

PP 8.8. List 1: Primary BCOCs (continued)

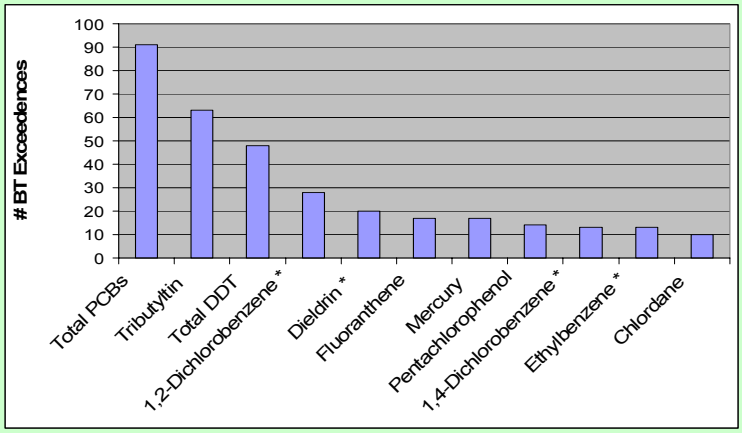
List 1: Primary BCOCs

Implications for bioaccumulation testing

- **DAIS Query comparing former and revised lists**
- **Frequency of BT exceedence by chemical**
- **# bioaccumulation tests that would be required**

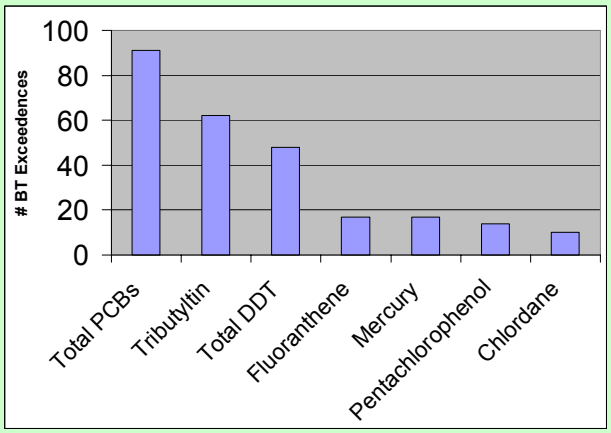
PP 8.9. List 1: Primary BCOCs (continued)

Frequency of BT Exceedences: >10 from former BCOC List



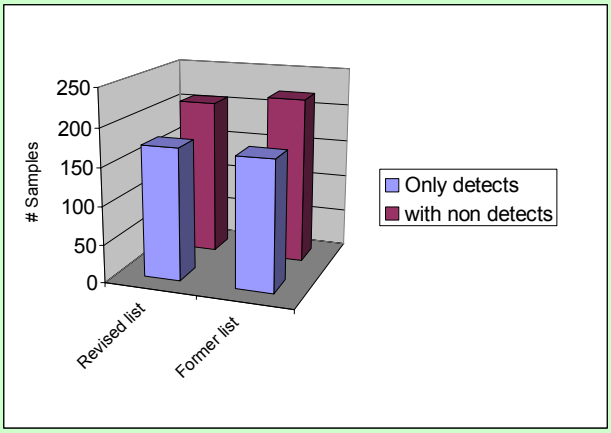
PP 8.10. Frequency of BT Exceedences: >10 from former BCOC List

Frequency of BT Exceedences: > 10 from revised BCOC List



PP 8.11. Frequency of BT Exceedences: >10 from former BCOC List

Number of sediments needing bioaccumulation testing



PP 8.12. Number of sediments needing bioaccumulation testing

List 2: Candidate BCOCs

- 3 pesticides added to first draft list (chlorpyrifos, diazinon, Ethion)
- Specified minimum criteria for having "enough" tissue data (#surveys, #species, # samples)
- No chemicals removed

PP 8.13. List 2: Candidate BCOCs

List 2: Candidate BCOCs

Results of 2002 Elliott Bay Disposal Monitoring:

- No List 2 chemicals detected in sediments or tissues
- Analysis can be done with existing methods
- Per sample cost approx. $500 in sediment and tissue.

PP 8.14. List 2: Candidate BCOCs

List 3: Potentially Bioaccumulative

- Biggest list
- Contains 9 former BCOC chemicals
- Focus of periodic updates to data base

PP 8.15. List 3: Potentially Bioaccumulative

List 4: No Further Consideration

- 10 chemicals from former BCOC list (8 due to Log Kow < 3.5)
- Deprioritized but not forgotten...

PP 8.16. List 3: No Further Consideration

Implementation

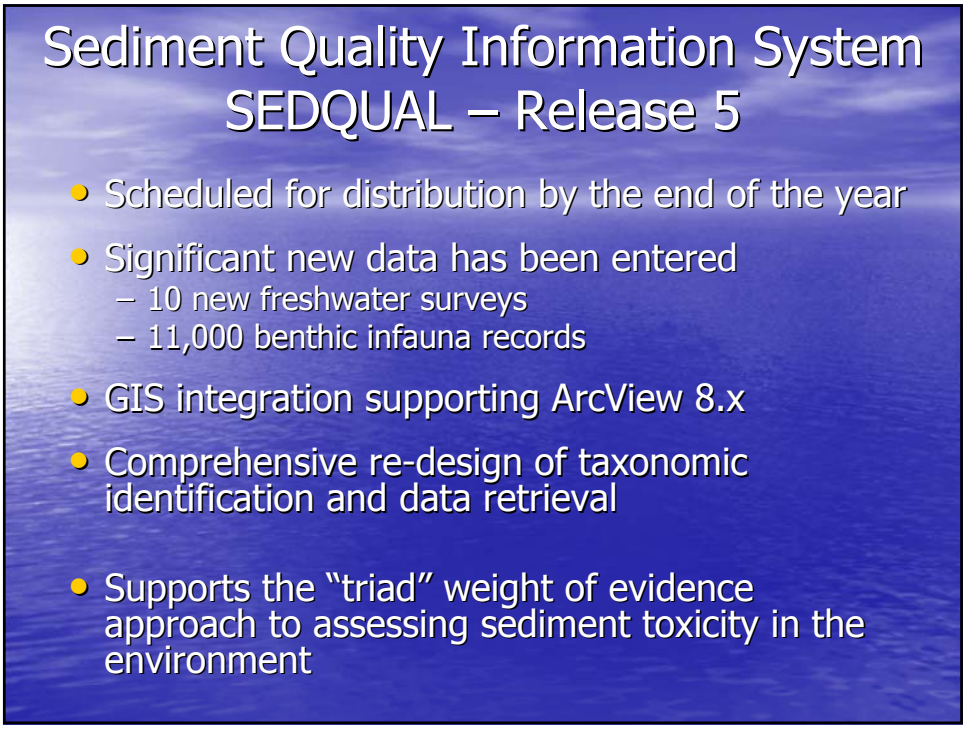
- Analysis of all List 1 chemicals required as of June 16, 2003 (new dredging year)
- Interim BTs and standard methods provided
- TTLs will be developed on project specific basis

PP 8.17. Implementation

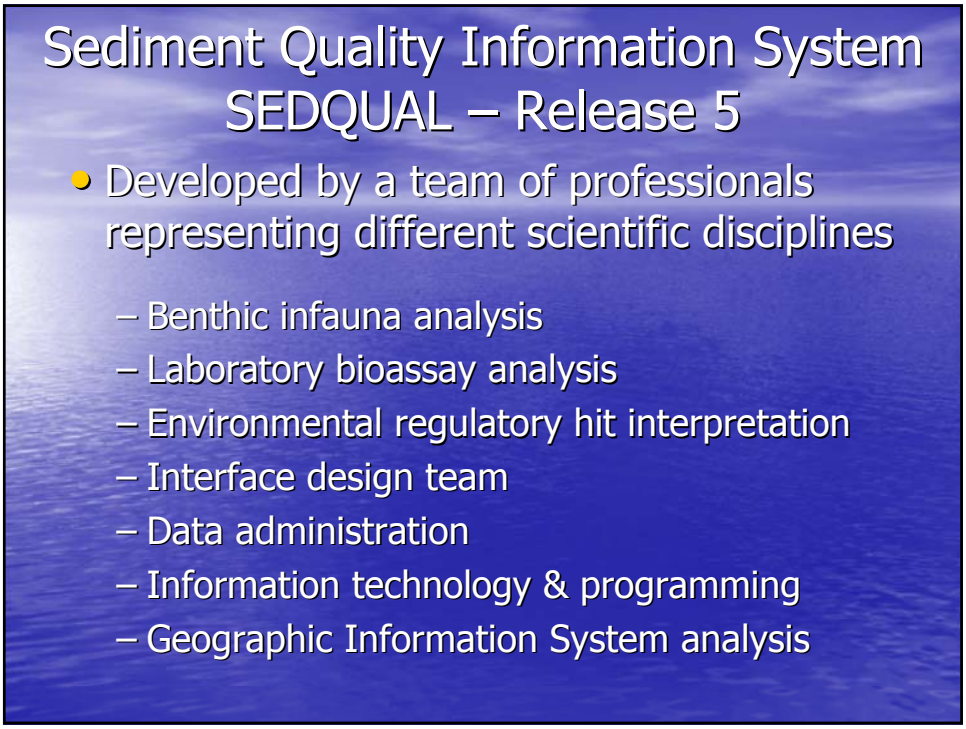
Next Steps

- 30 day review period for Issue Paper
- Technical Appendix (Fall 2003) - look for posting on DMMO web site at: *www.nws.usace.army.mil*
- Incorporation of fresh water tissue data and possible development of separate BCOC lists
- Periodic update of BCOC data base and list revisions (schedule TBD)
- BWG develops final BTs and TTLs for List 1 chemicals.

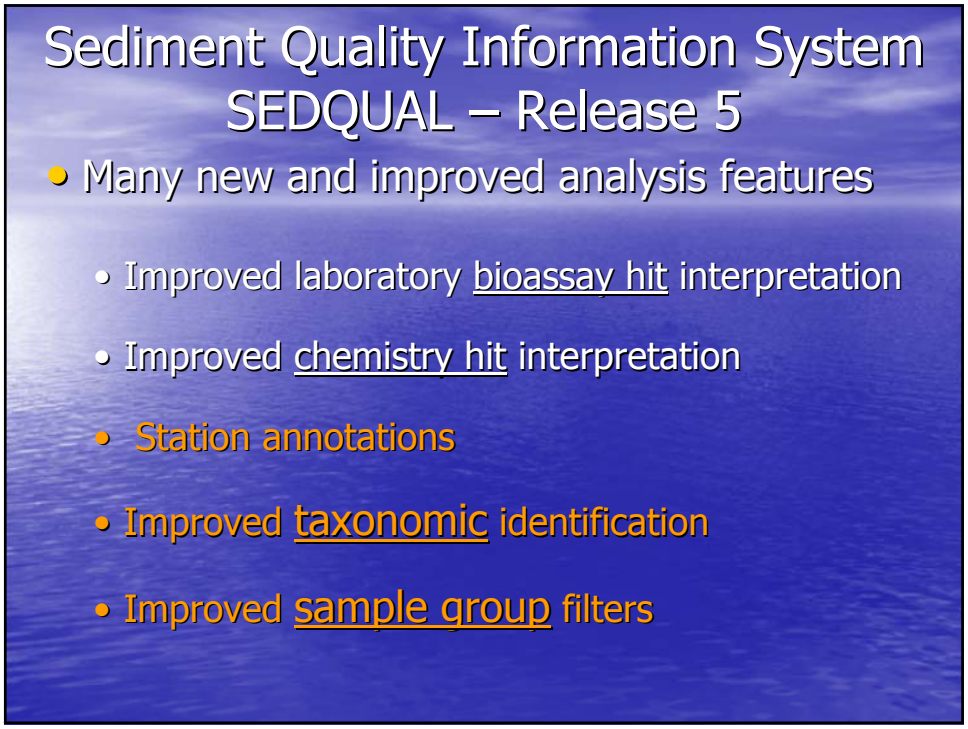
PP 8.18. Next Steps



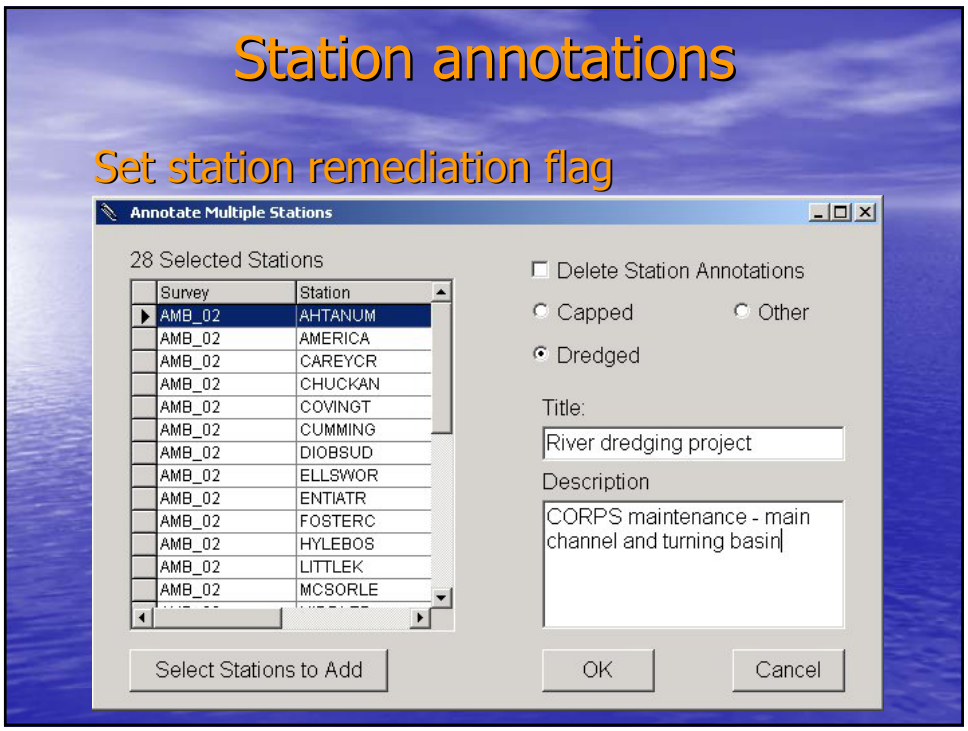
PP 9.1. Sediment Quality Information System SEDQUAL - Release 5



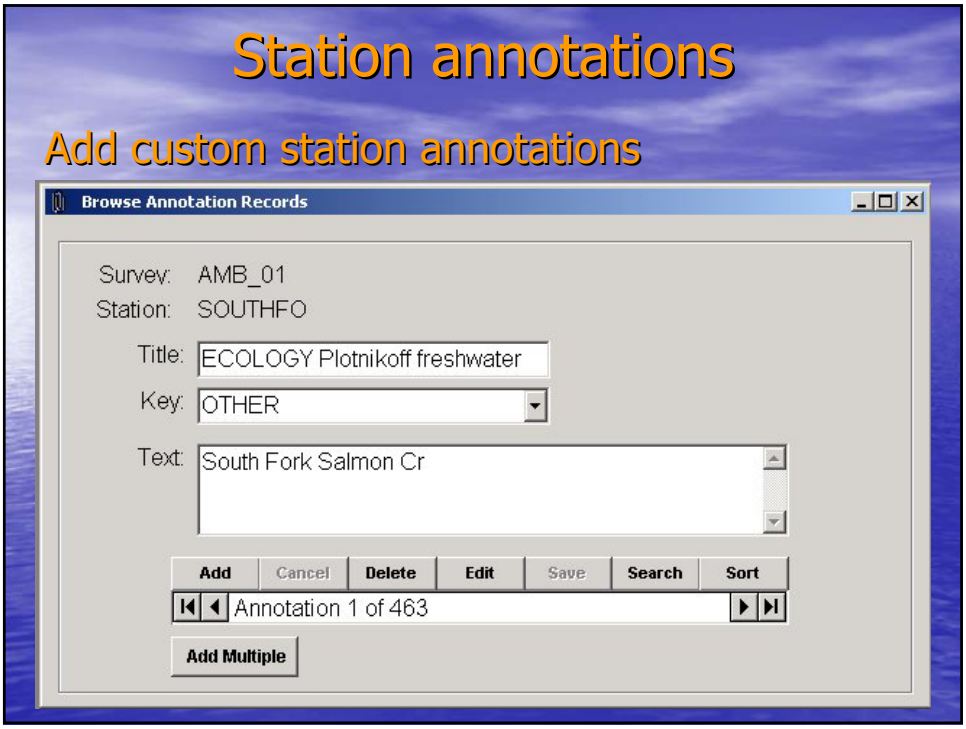
PP 9.2. Sediment Quality Information System SEDQUAL - Release 5 (continued)



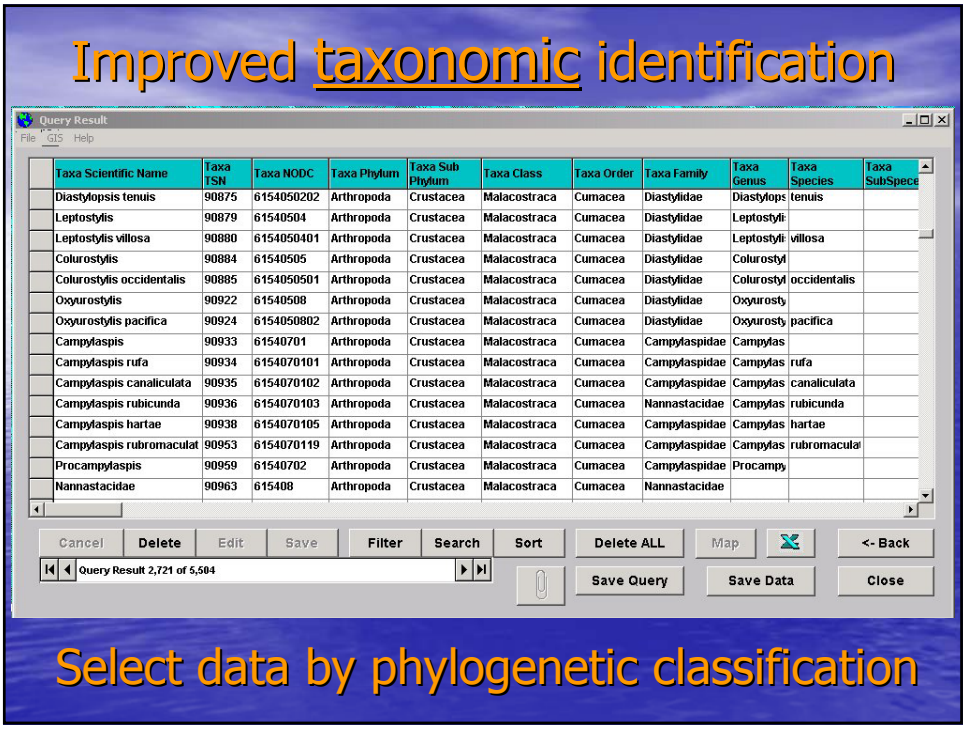
PP 9.3. Sediment Quality Information System SEDQUAL - Release 5 (continued)



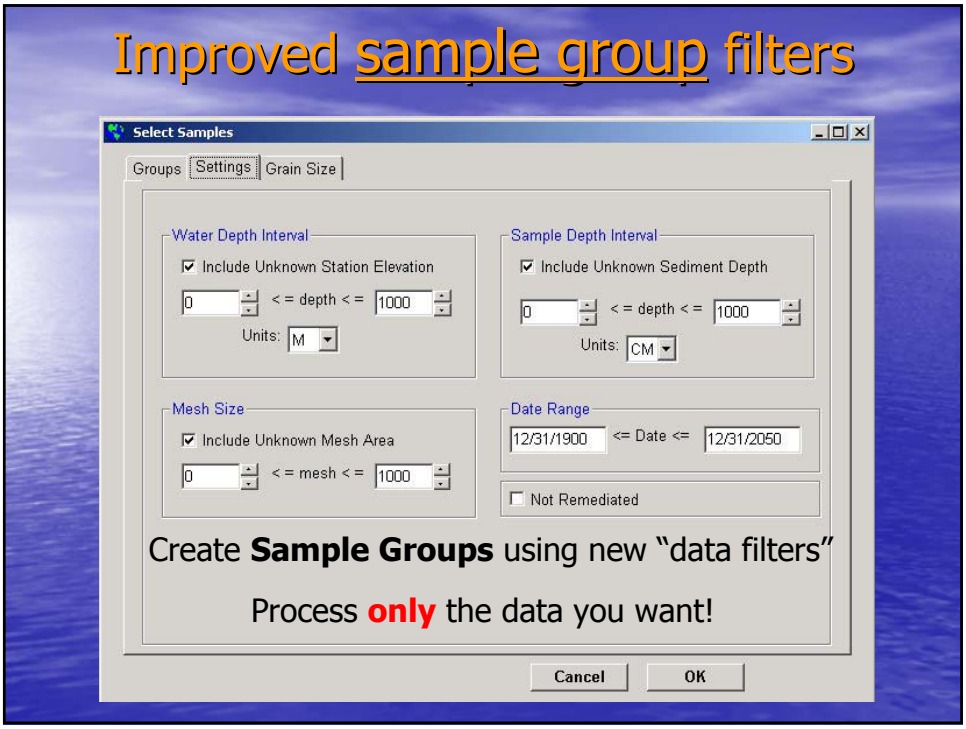
PP 9.4. Station Annotations



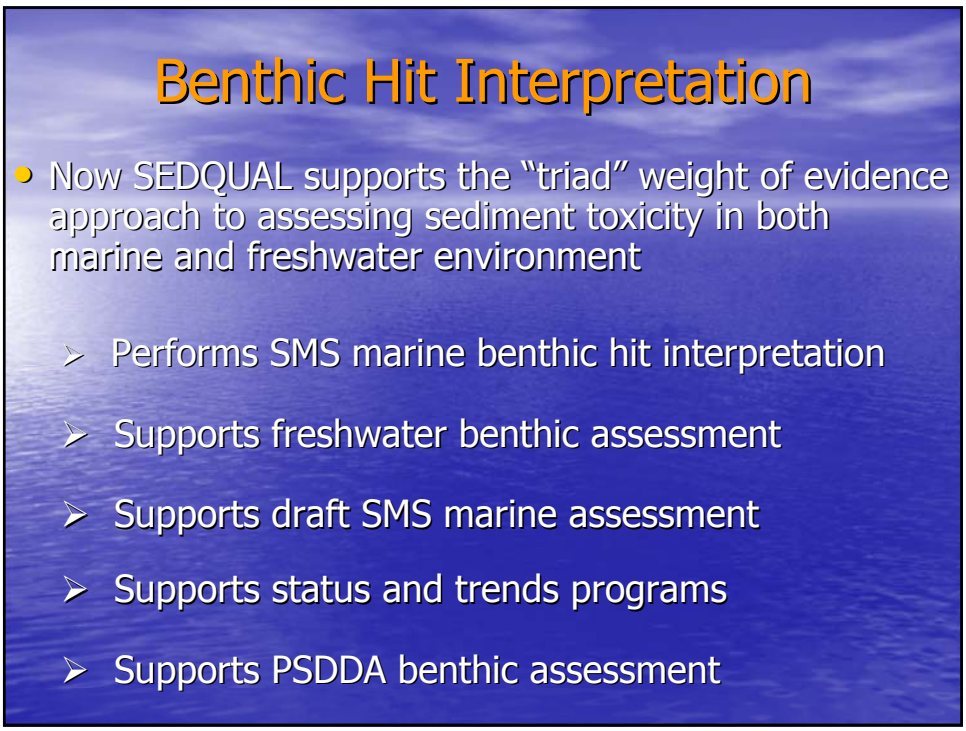
PP 9.5. Station Annotations (continued)



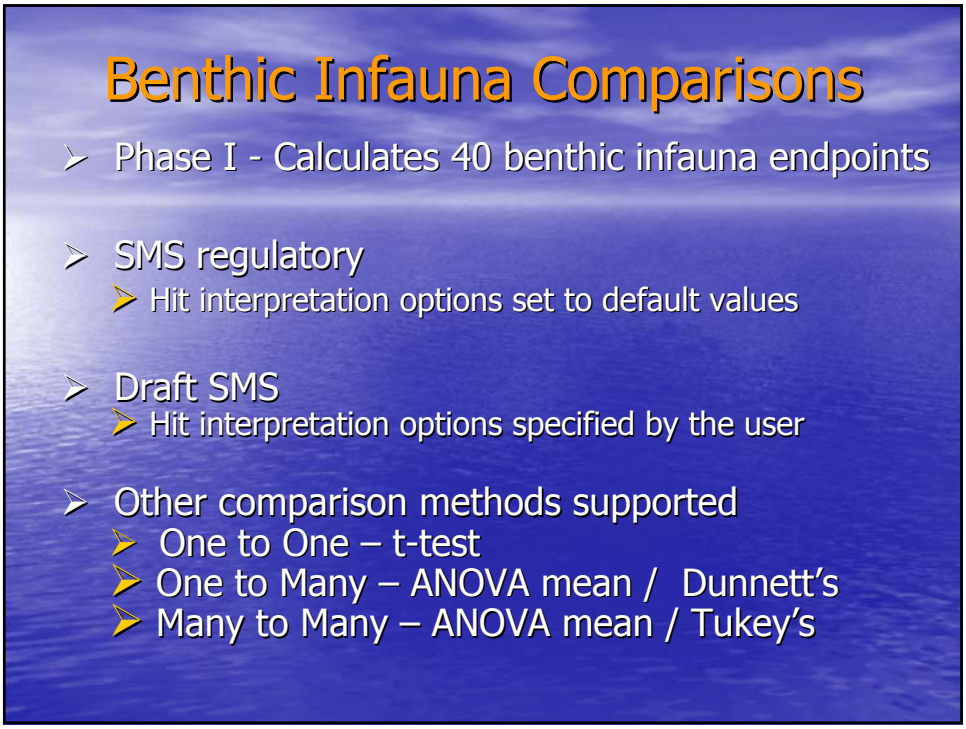
PP 9.6. Improved taxonomic identification



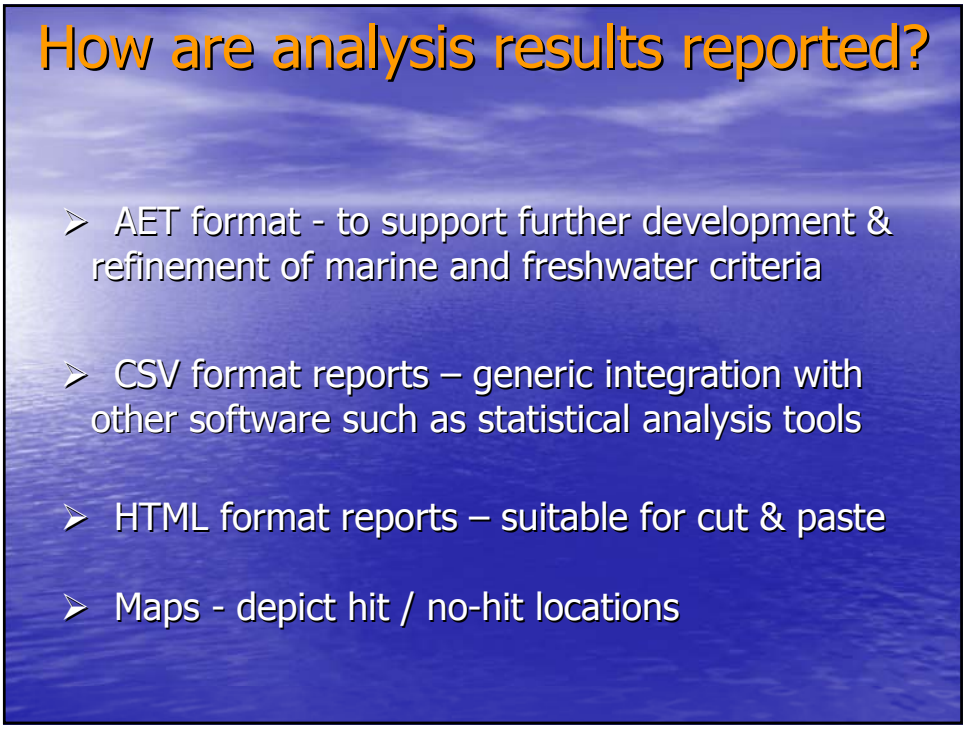
PP 9.7. Improved sample group filters



PP 9.8. Benthic Hit Interpretation



PP 9.9. Benthic Infauna Comparisons



PP 9.10. How are analysis results reported?

SMS Clarification Paper

Use of Interpolation Methods for Characterizing Distribution of Sediment Chemical Contamination, Area-Weighted Averaging, and Mass and Volume Calculations

Prepared by Maureen Goff, SAIC, for Ecology

PP 10.1. Use of Interpolation Methods for Characterizing Distribution of Sediment Chemical Contamination, Area-Weighted Averaging, and Mass and Volume Calculations

Introduction

Washington State's Sediment Management Standards (SMS) Chapter 173-204 WAC:

- Requires the characterization of distribution of sediment chemical contamination and biological effects at any site of interest.

WAC 173-204-130(1) and (4):

- Mandates a goal of the use of latest scientific knowledge via identification, review and approval of alternate technical methods deemed appropriate by Ecology.

PP 10.2. Introduction

Purpose

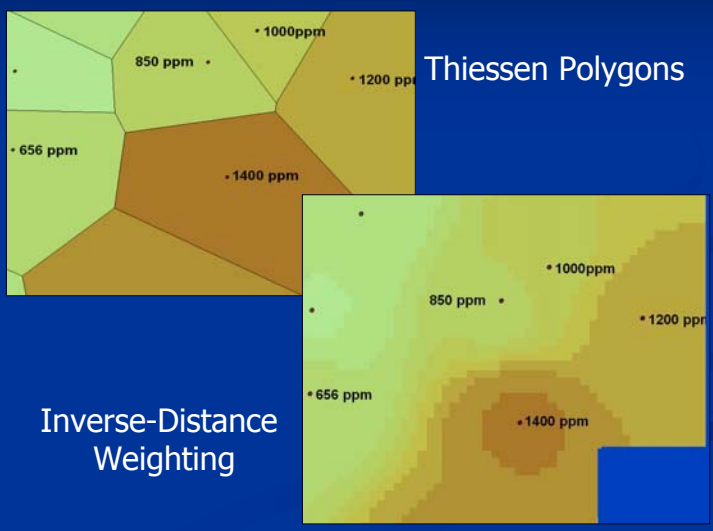
To Provide Clarification to SMS Rules by….

- …Proposing "best available science" as spatial interpolation methods (Inverse-Distance Weighting, Natural Neighbor, Kriging, etc) over Thiessen or other randomly assigned polygons.
- …Documenting the technical advantages of spatial interpolation methods.
- …Documenting improved predictions (lower error) with spatial interpolation methods through Case Study findings.

PP 10.3. Purpose

Ecology Case Study

Estimating Areas and Concentrations



Thiessen Polygons

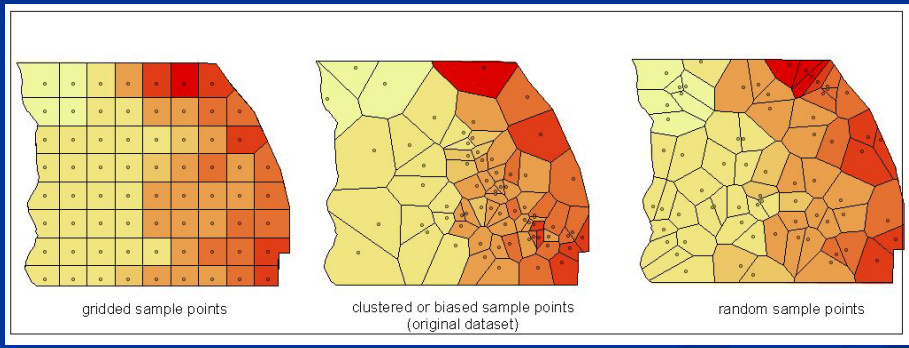
Inverse-Distance Weighting

PP 10.4. Estimating Areas and Concentrations

Ecology Case Study

Thiessen Polygons

Solely determined by distribution of points



PP 10.5. Thiessen Polygons

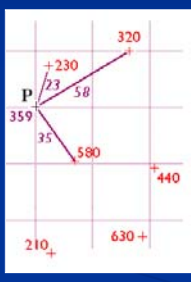
Inverse Distance Weighting (IDW)

$$G(x,y) = \sum_{i=1}^{n} w_i f(x_i, y_i)$$

$$w_i = d_i^{-p} \Big/ \sum_j d_j^{-p}$$

where: $G(x,y)$ is the IDW estimation at (x,y);
$f(x_i,y_i)$ is the observed value at (x_i,y_i);
n is the number of nearest neighbors used for interpolation;
w_i is the weight associated with $f(x_i,y_i)$;
d_i is the distance from (x,y) to (x_i,y_i); and
p is power, a real number.

The weights are inversely related to distance and are scaled such that the sum of all the weights will add to one.



$$z_P = \frac{\sum_{i=1}^{n} \left(\frac{z_i}{d_i}\right)}{\sum_{i=1}^{n} \left(\frac{1}{d_i}\right)} = \frac{\frac{230}{23} + \frac{320}{58} + \frac{580}{35}}{\frac{1}{23} + \frac{1}{58} + \frac{1}{35}}$$

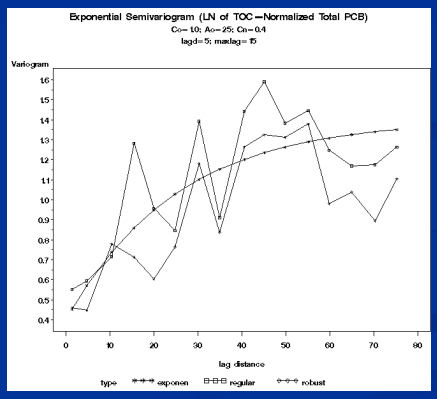
PP 10.6. Inverse Distance Weighting (IDW)

Ecology Case Study

Spatial Correlation

The semi-variogram provides a measure of variance as a function of distance between data points.

Measure of Dissimilarity



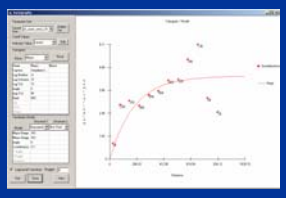
Distance in feet

PP 10.7. Spatial Correlation

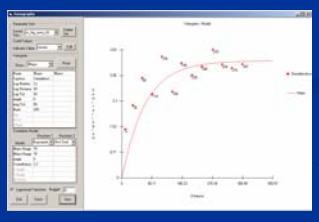
Ecology Case Study

Spatial Correlation

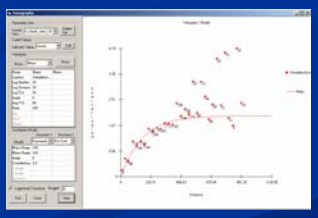
The semi-variogram provides a measure of variance as a function of distance between data points.



Acenapthene – 150 feet



Hg - 100 feet

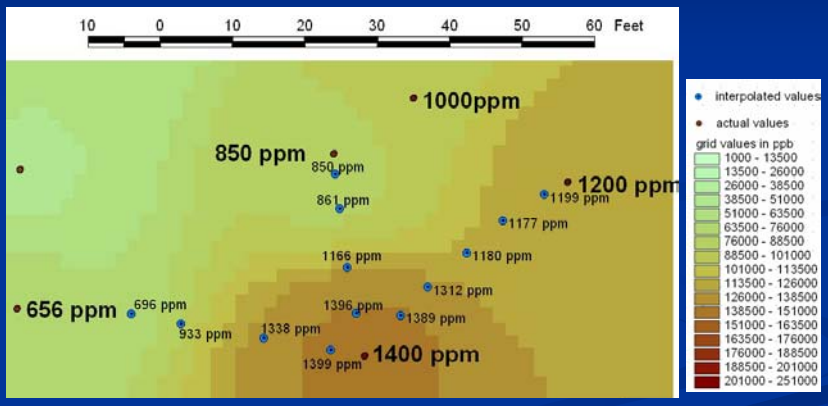


HPAH – 200 feet

PP 10.8. Spatial Correlation

Ecology Case Study

Interpolated Values

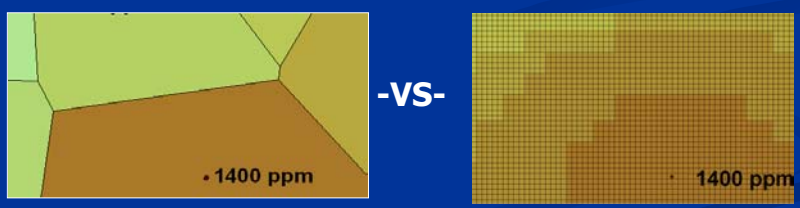


PP 10.9. Interpolation Values

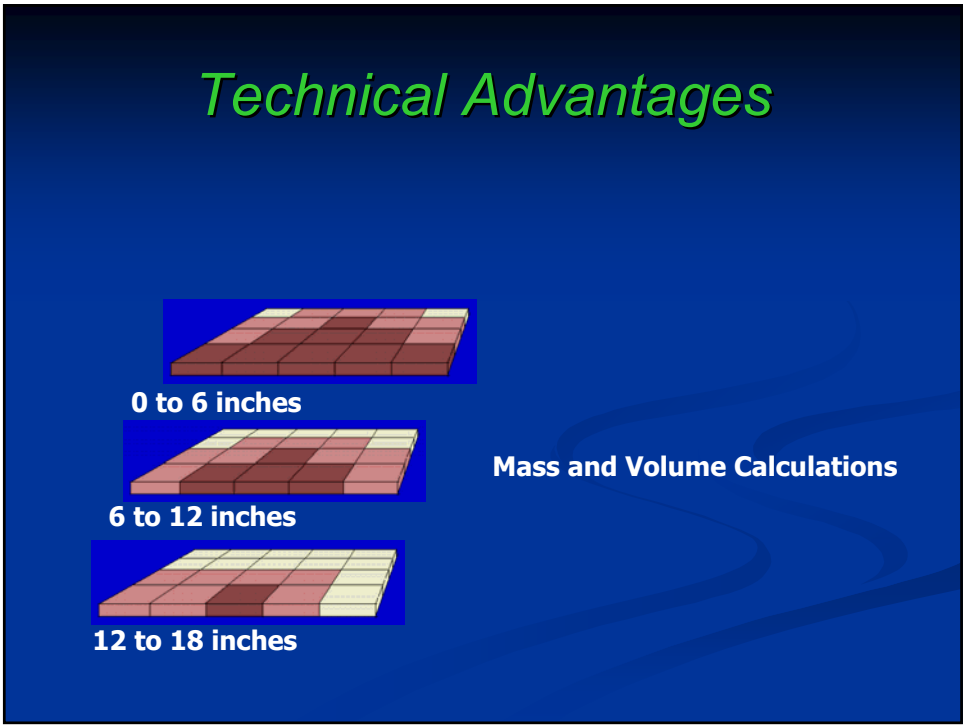
Ecology Case Study

Technical Advantages

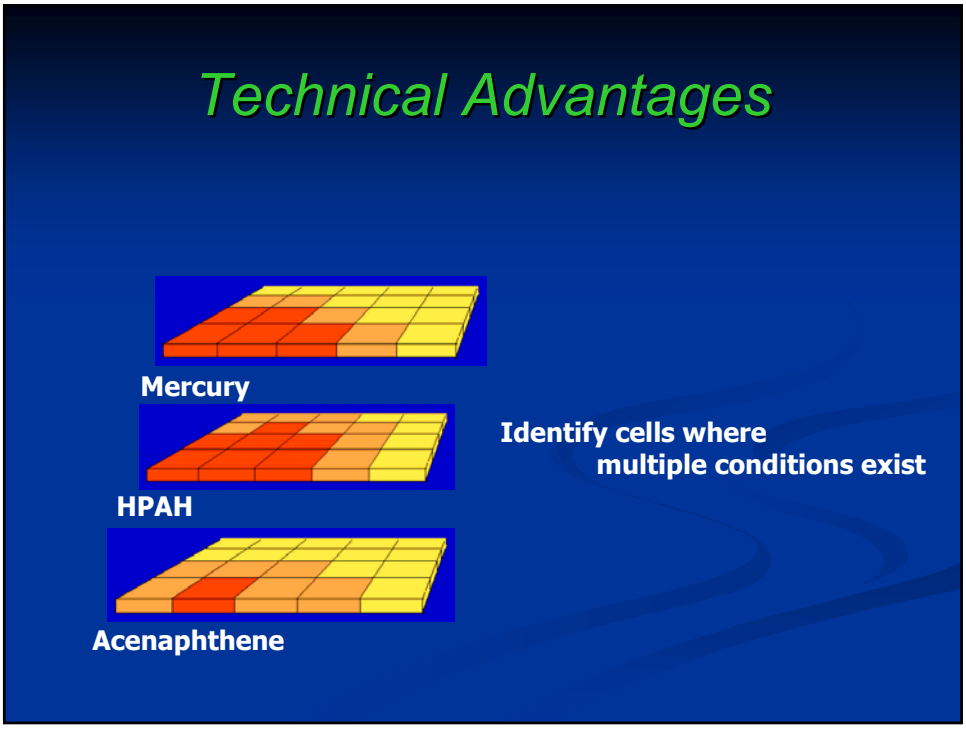
- A grid is made up of equal-sized cells.
- Each cell has an assigned value based on neighboring data points.



PP 10.10. Technical Advantages

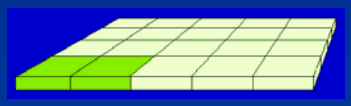


PP 10.11. Technical Advantages (continued)



PP 10.12. Technical Advantages (continued)

Technical Advantages



2000 – Crab Habitat

2001- Crab Habitat

2002 – Crab Habitat

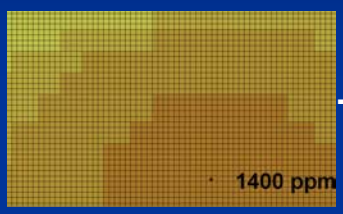
Identify changes over time
- **-chemistry**
- **-biological**
- **-depth**
- **-sediment thickness**

PP 10.13. Technical Advantages (continued)

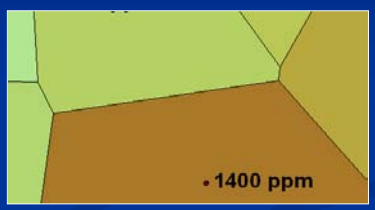
Ecology Case Study

Technical Advantages

Calculating Area-weighted Averages



-VS-



•Calculate average of the grid

•Calculate percent area of each polygon
•Multiply percent by concentration
•Calculate average

PP 10.14. Technical Advantages (continued)

Ecology Case Study

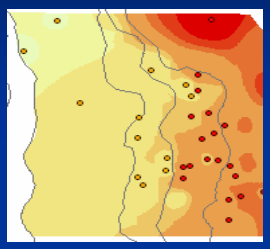
Comparing Methods

	Area-Weighted Average in ppb	CuYds of sediment > 53000 ppb
CLUSTERED DATA POINTS		
Thiessen Polygons	35160	6009
Inverse Distance Weighting	30970	5963
RANDOM DATA POINTS		
Thiessen Polygons	33922	5635
Inverse Distance Weighting	34155	5765
GRIDDED DATA POINTS		
Thiessen Polygons	33772	6295
Inverse Distance Weighting	33459	6473
**based on 0 to 6 inches, density 2500, removal > 53000 PPB		

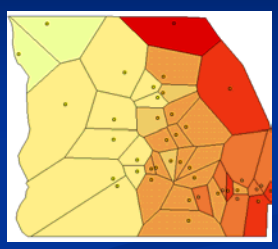
PP 10.15. Comparing Methods

Ecology Case Study

Comparing Estimation Error

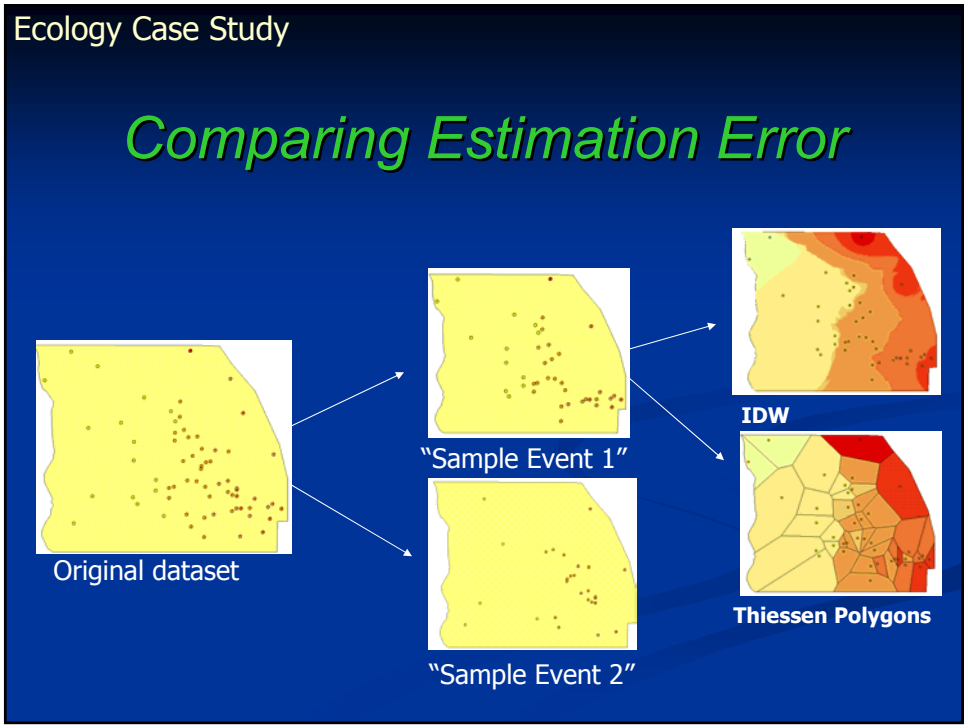


-VS-

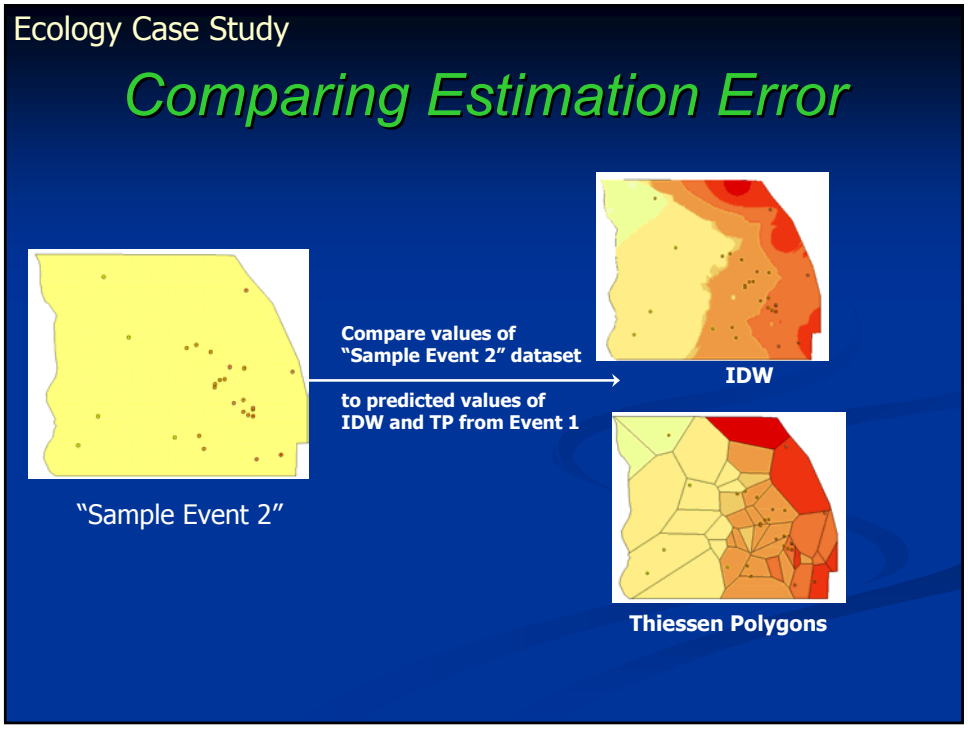


Predicted concentrations and area determine:
- Area-weighted averages
- Mass and Volume estimates
- Clean-up cost estimates

PP 10.16. Comparing Estimation Error



PP 10.17. Comparing Estimation Error (continued)



PP 10.18. Comparing Estimation Error (continued)

Ecology Case Study

Improved Estimation Error

Estimation error analysis was done comparing the estimated values of each method to the actual values of a "secondary sample event" subset.

- Acenapthene IDW 27% lower error
- HPAH IDW 20% lower error
- Mercury IDW 10% lower error

PP 10.19. Improved Estimation Error

Summary

The Best Available Science for characterizing the distribution of sediment chemical contamination should utilize the tools that provide the greatest…

…Accuracy in estimating values at unsampled locations

- To improve area-weighted average calculations
- To improve mass and volume estimates
- To improve clean-up cost projections

…Technical Advantages

- Availability
- Accessibility
- Increased Functionality of Grids
  - Mass and volume
  - Area-weighted average
  - Comparisons over time, identifying trends
  - Identification of multiple conditions - cell by cell

PP 10.20. Summary

References

Burrough, Peter A. and McDonnell, Rachael A, Principles of Geographic Information Systems.1998. 98, 115-117.

Isaaks, E.H., and Srivastava, R.M., An Introduction to Applied Geostatistics, Oxford University Press, New York, 1989.

Watson, D.F. and Philip, G.M., *A Refinement of Inverse Distance Weighted Interpolation*, Geo-Processing, 2 .1985. 315-327.

W.Tobler, 1979, "Smooth pycnophylactic interpolation for geographical regions", *Journal of American Statistical Association*, 74, 367:519-536

EPA QA/G-5S, December 2002, *Guidance on Choosing a Sampling Design for Environmental Data Collection*, p.28.

Contact:

Maureen Goff	*SAIC*	*maureen.a.goff@saic.com*
Brett Betts	*Ecology*	*bbet461@ECY.WA.GOV*

PP 10.21. References

Freshwater Sediment Quality Guidelines for Washington State

Teresa Michelsen
Avocet Consulting
on behalf of
WA Dept. of Ecology

WASHINGTON STATE DEPARTMENT OF ECOLOGY

PP 11.1. Freshwater Sediment Quality Guidelines for Washington State

Participants

- Washington Department of Ecology
  - Brett Betts
  - Tom Gries
  - Pete Adolphson
  - Martin Payne
- SAIC
  - Ted Turk
  - Michelle Payne
  - Tim Hammermeister
  - Chris Hunt

PP 11.2. Participants

Phase I - 2002

- Compile synoptic chemistry/bioassay data
- Screen and quality assure data
- Program SEDQUAL bioassay SQV comparison tool
- Compile and evaluate existing SQV sets against narrative program criteria
- Assess reliability of best-scoring SQV sets
- Exploratory work for Phase II

PP 11.3. Phase I - 2002

SQV Evaluation

Evaluated:

- 1997 Apparent Effects Thresholds, Probable AETs (95th percentile)
- No-Effects Concentrations (EPA Region 5)
- Effects Range Low, Effects Range Median (ERL/ERM)
- CCME Threshold Effects Level, Probable Effects Level (TEL/PEL)
- Consensus-Based Guidelines (TEC/PEC)
- Ontario Lowest Effects Levels and Severe Effects Levels (LEL/SEL)
- Equilibrium Partitioning (EqP)

PP 11.4. SQV Evaluation

Evaluation Criteria

- Consistency with SMS
- Technical Merits
- Field Applicability
- Biological Relevance
- Practicability
- Regulatory Use/Precedent

Highest scores: AET/PAET, TEL/PEL, TEC/PEC, LEL/SEL

PP 11.5. Evaluation Criteria

Reliability Assessment

- Assemble database
- Select analyte list for assessment
- Develop biological interpretation guidelines
- Identify hit and no-hit stations (based on pooled interpretation guidelines)
- Compare chemical data to guidelines to determine hit/no-hit predictions
- Compare predictions to biological hit/no-hit results

PP 11.6. Reliability Assessment

Reliability Assessment Results

- Most to least conservative:

  TEL/TEC/LEL, AET/PAET, PEL/PEC/SEL

- TEL/TEC/LEL had low false negatives (5-20%), but very high false positives (80-90%) - not good screening levels because everything is screened in
- PEL/PEC/SEL had false negatives of > 40%
- Best were AETs/PAETs and PELs with false negatives 20-40% and false positives 40-60% - still too high for regulatory use
- Phase II needed to develop more reliable SQVs

PP 11.7. Reliability Assessment Results

Recommendations for Use

- Below TEL - screen out, no further action needed
- Between TEL and PAET - low priority
- Between PAET and SEL - medium priority
- Above SEL - high priority

None of the existing SQVs are reliable enough for stand-alone use, this is the focus of the Phase II SQV development program

PP 11.8. Recommendations for Use

Other Phase I Results

- Comparison to control produced better reliability than comparison to reference
- Mixed reference and control had much lower reliability - similar to current practice
- More complete database allows calculation of two new AETs - *Chironomus* mortality and *Chironomus* growth - but still no chronic or benthic endpoints

PP 11.9. Other Phase I Results

Phase II Activities

- Additional SEDQUAL updates
- Recalculation of FW AETs:
  - *Hyalella azteca* 10-day mortality
  - *Chironomus tentans* 10-day mortality
  - *Chironomus tentans* 10-day growth
  - Microtox 15-minute luminescence
- Calculation of alternative guidelines:
  - Optimal/alternative percentiles for AETs
  - Error rate minimization techniques (floating percentiles)
- Reliability assessment

PP 11.10. Phase II Activities

Phase II Status

- SEDQUAL programming and update completed
- Microtox interpretive guidelines updated
- All four AETs recalculated
- Optimal percentiles for AETs identified
- Floating percentile calculations completed
- PAH summing comparisons completed
- Sensitivity analysis completed

May 2003: Quality assurance and final report

PP 11.11. Phase II Status

Draft Phase II Results

- Updated AETs still appear to have low sensitivity - could be due to variation in metals bioavailability
- PAH summing does not appear to improve reliability, but may still be helpful
- Choosing a lower no-hit percentile (70th to 95th) for AETs reduces error rates by 20% or so but some are still too high
- Draft floating percentile FW guidelines have false negatives 15%, false positives 25%, overall accuracy of 80+%
- Best accuracy when metals are set low, PAHs high

PP 11.12. Draft Phase II Results

Toxicity Drivers

Hot:

- As, Cd, Cu, Hg, Sb, Zn
- TBT
- Bis(2-ethylhexyl)phthalate, di-n-octyl phthalate
- Total PCBs
- Summed PAHs

Not:

- Individual PAHs or Aroclors
- Other phthalates
- Cr, Pb, Ni, Ag

PP 11.13. Toxicity Drivers

PILOT TEST

Electrochemical Remediation Technologies Treating Mercury and Organic Contaminants in Puget Sound Marine Sediments

prepared by

Brad Helland[1], *William A. McIlvride*[2], *Donald G. Hill*[2], *Falk Doering*[3], ***Joe L. Iovenitti***[2], *Niels Doering*[3]

WASHINGTON STATE DEPARTMENT OF ECOLOGY

1

PP 12.1. Pilot Test - Electrochemical Remediation Technologies Treating Mercury and Organic Contaminants in Puget Sound Marine Sediments

PROJECT TEAM

- **Washington State Department of Ecology (Ecology)**
- **U.S. EPA SITE Program**
- **SAIC**
- **electrochemical processes, llc (ecp)**
- **Weiss Associates**
- **Assistance from Georgia-Pacific and Numerous Other Bellingham Bay Stakeholders**

Joint WA Depts Ecology, Natural Resources, and Transportation, EPA SITE, and Weiss funded project

WASHINGTON STATE DEPARTMENT OF ECOLOGY

2

PP 12.2. Project Team

PROJECT BASIS

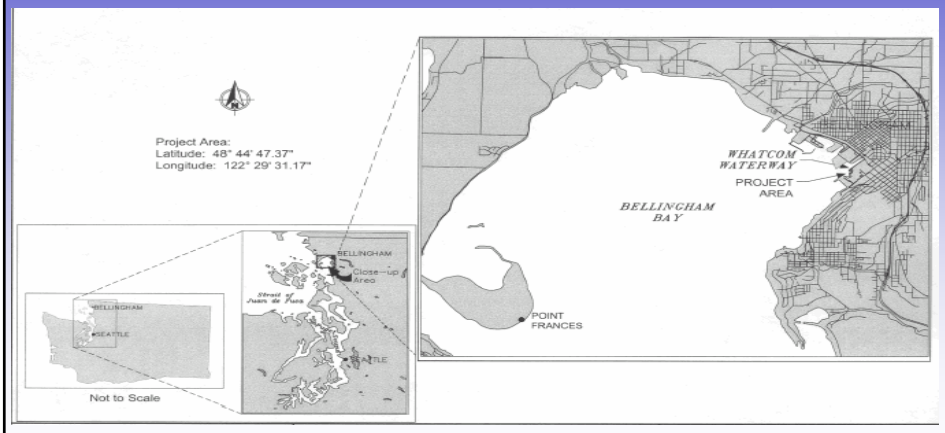
- **Stakeholders Wanted to Evaluate the Feasibility of Using *in situ* Remediation on Contaminated Sediments in Puget Sound**
- **ECRTs Are an Innovative Technology Developed by ecp and Are Being Used Commercially in Europe**
- **ecp Has Remediated Mercury in Fresh and Brackish Water Environments; PAHs and Phenols in Fresh Water**
- **Stakeholders Submitted a proposal to U.S. EPA SITE Program**

WASHINGTON STATE DEPARTMENT OF ECOLOGY

PP 12.3. Project Basis

PUGET SOUND *IN SITU* DEMO

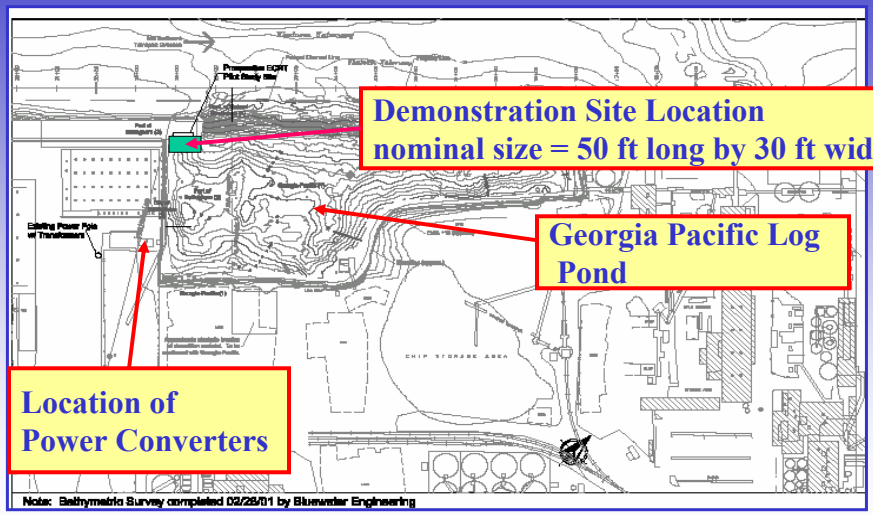
Principal COCs Are Hg, Phenols, and PAHs



WASHINGTON STATE DEPARTMENT OF ECOLOGY

PP 12.4. Puget Sound in situ Demo

PUGET SOUND *IN SITU* DEMO

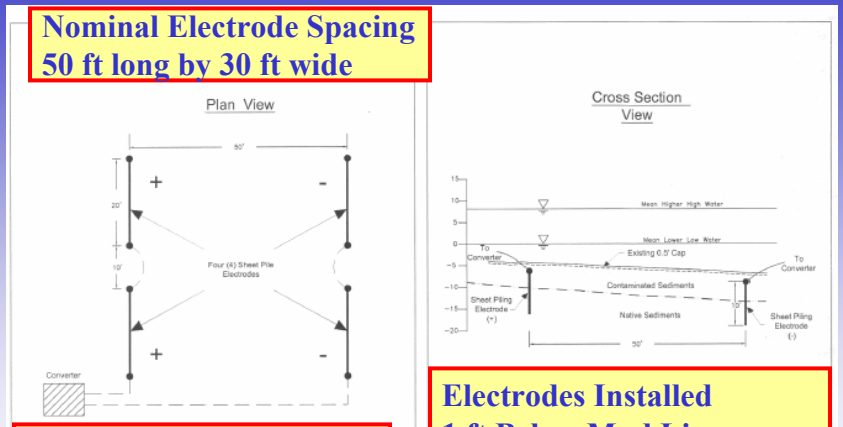


WASHINGTON STATE DEPARTMENT OF ECOLOGY

PP 12.5. Puget Sound in situ Demo (continued)

PUGET SOUND *IN SITU* DEMO

Nominal Electrode Spacing
50 ft long by 30 ft wide



3 Electrode Pairs Installed
1 Pair per Converter

Electrodes Installed
1 ft Below Mud Line,
Extending to 7 ft Below
Mud Line

WASHINGTON STATE DEPARTMENT OF ECOLOGY

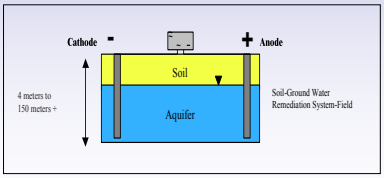
PP 12.6. Puget Sound in situ Demo (continued)

ECRTs BASIS

- Proposed Mechanisms
  1. Induced REDOX Reactions
     - Destruction of organics via the **ECRTs-ECGO (ElectroChemicalGeoOxidation)** process
     - Enhanced mobilization of metals via the **ECRTs-IC (Induced Complexation)** process

       Also requires the ElectroKinetic processes of Electro-Osmosis, Electro-Migration, and Electro-Phoresis at formation scale
  2. Electrolysis Occurring at Pore Scale on Sediment Surfaces
- Technologies Are Empirically Based with > 60 Field Projects in Europe and U.S.

Soil-Sediment-Ground Water System = Electrochemical Cell



WASHINGTON STATE DEPARTMENT OF ECOLOGY

PP 12.7. ECRTs Basis

PROCESS FLOW—ELECTRICITY

Use Local Utility Power or a generator

Electrodes—either *ex-situ* or *in-situ*

DC/AC Converters

Induce Oxidation-Reduction (REDOX) Reactions

Electrolysis of water

Mobilization and/or destruction of contaminants

WASHINGTON STATE DEPARTMENT OF ECOLOGY

PP 12.8. Process Flow - Electricity

INDUCED REDOX REACTIONS

- Electrodes are placed in the soil/sediment where a (proprietary) low voltage and low amperage coupled DC/AC field is imposed
- Soil particles and pore throats are electrically polarized
  - the soil acts as a capacitor, discharging and charging electricity, in response to the externally applied field

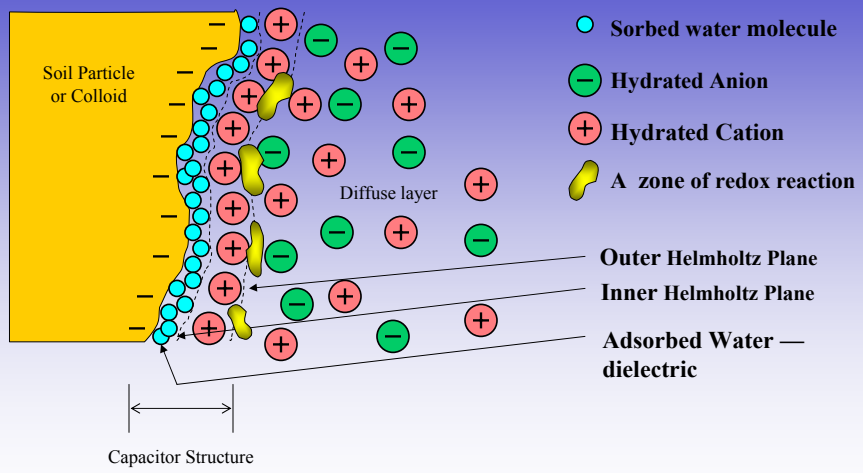
    electrical discharge cycle = reduction

    electrical charging cycle = oxidation
  - REDOX reactions occur at a high frequency throughout matrix

WASHINGTON STATE DEPARTMENT OF ECOLOGY

PP 12.9. Induced Redox Reactions

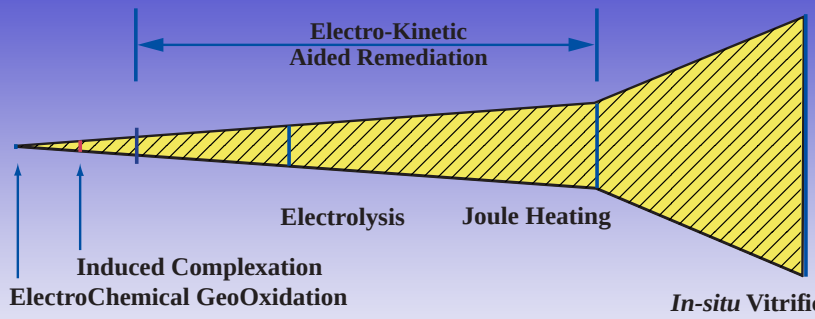
ECRTs PORE SCALE REDOX MODEL



WASHINGTON STATE DEPARTMENT OF ECOLOGY

PP 12.10. ECRTs Pore Scale Redox Model

ELECTRICAL ENERGY INPUT



ECRTs lie at the low end of the energy continuum

- Range from induced REDOX reactions to mass transport to heating to melting of the soil/sediment

WASHINGTON STATE DEPARTMENT OF ECOLOGY

11

PP 12.11. Electrical Energy Input

INSTALLATION

Port of Bellingham Pier

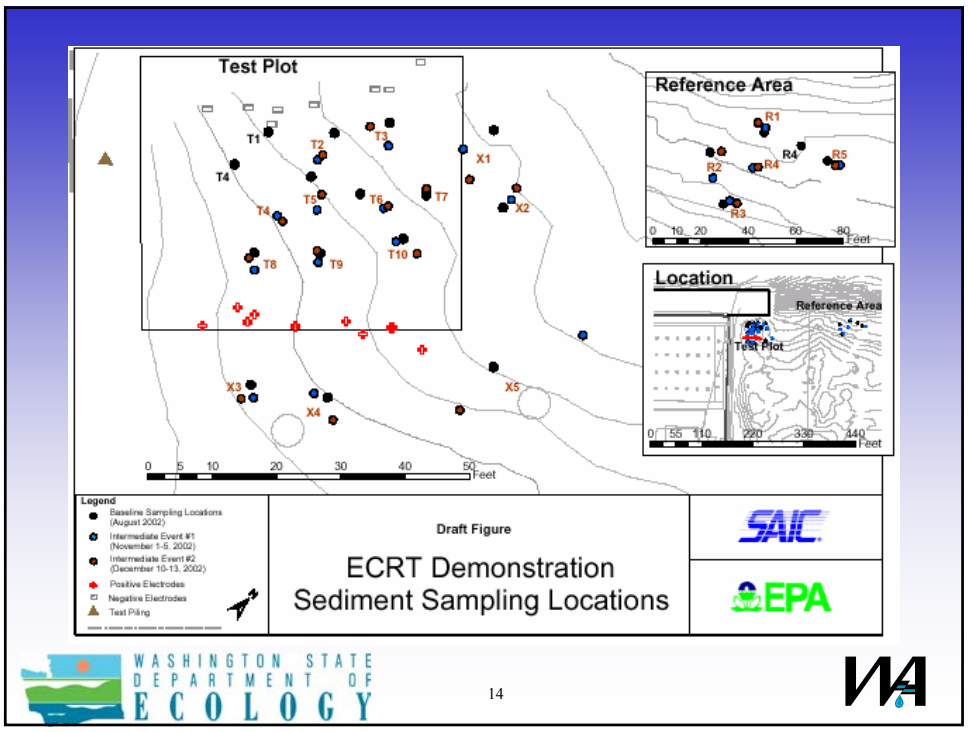
Demonstration Location

WASHINGTON STATE DEPARTMENT OF ECOLOGY

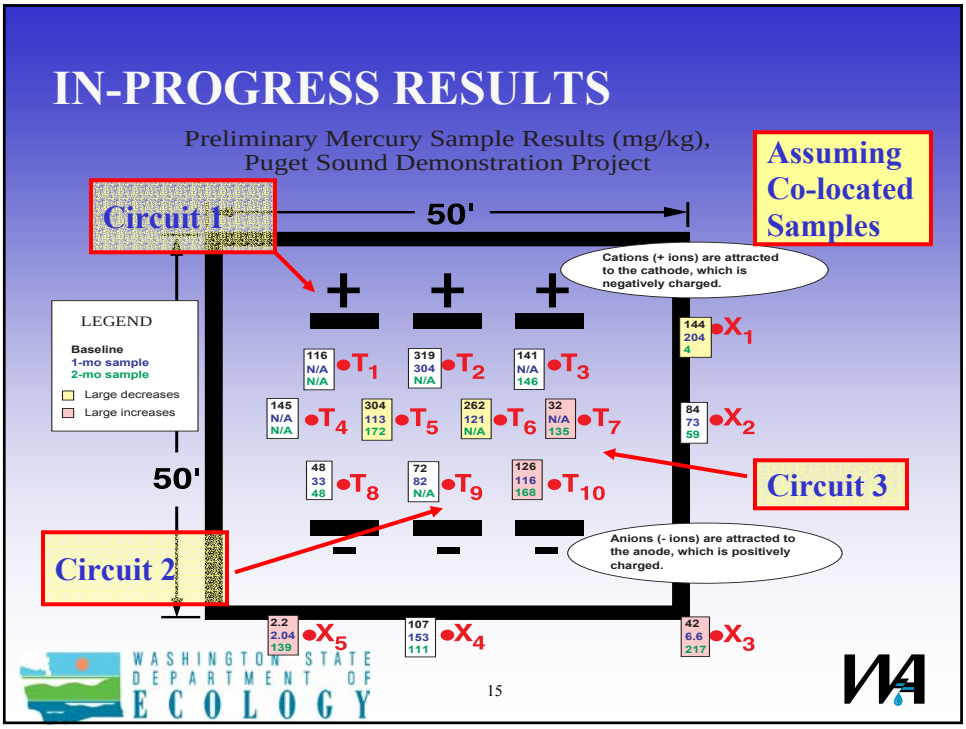
12

PP 12.12. Installation

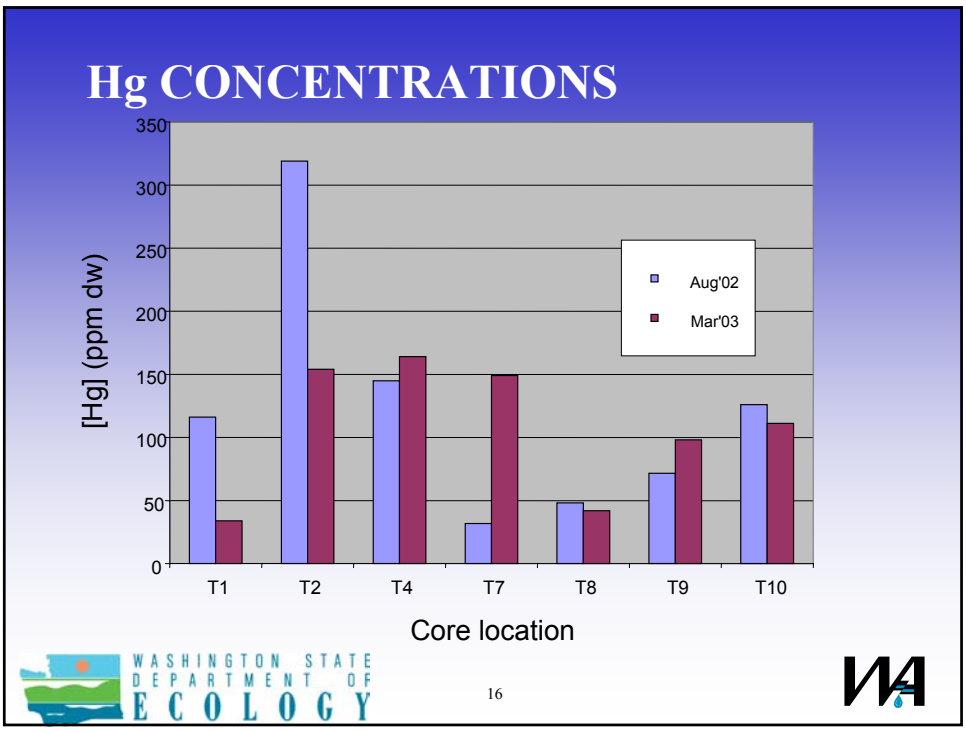
PP 12.13. Installation (continued)



PP 12.14. ECRT Demonstration Sediment Sampling Locations



PP 12.15. In-progress Results



PP 12.16. Hg Concentrations

REMOVAL

WASHINGTON STATE DEPARTMENT OF ECOLOGY

PP 12.17. Removal

REMOVAL

Electrode connection

WASHINGTON STATE DEPARTMENT OF ECOLOGY

PP 12.18. Removal (continued)

DISCUSSION

- Designed Run Time = 5.5 months
- Total Effective Run Time = 2.5 months
  - During course of the demonstration we encountered unexpected electrical system responses which we are evaluating
- Contaminant Heterogeneity
- Sampling and Analysis Variability

WASHINGTON STATE DEPARTMENT OF ECOLOGY

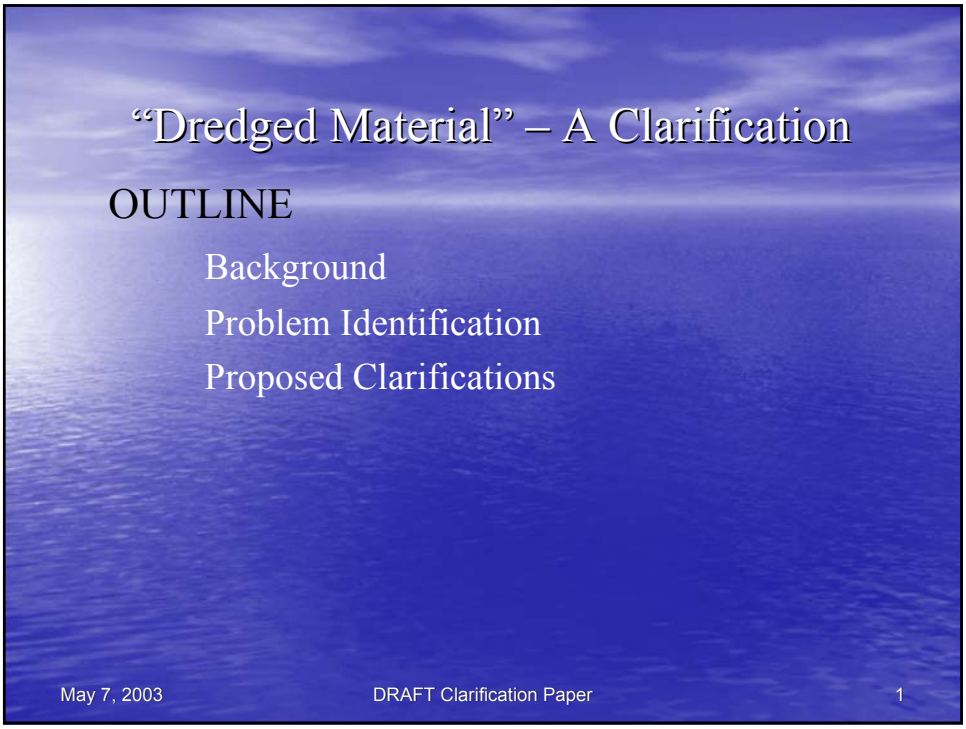
PP 12.19. Discussion

PROJECT STATUS

- Waiting On Final Field Sampling Chemical Results
- Waiting On Determination of Amount of Mercury Deposited on/in the Electrodes
- Variability in Concentration Changes in Test Area and Extended Area May Be Accounted by
  - Need for more remediation run time
  - Contaminant Heterogeneity
  - Sampling and Analysis Variability
- EPA, SAIC, Ecology, ecp, and Weiss Will Be Analyzing Test Data

WASHINGTON STATE DEPARTMENT OF ECOLOGY

PP 12.20. Project Status



PP 13.1. "Dredged Material" - A Clarification (Outline)

PP 13.2. "Dredged Material" - A Clarification (Background)

"Dredged Material" – A Clarification

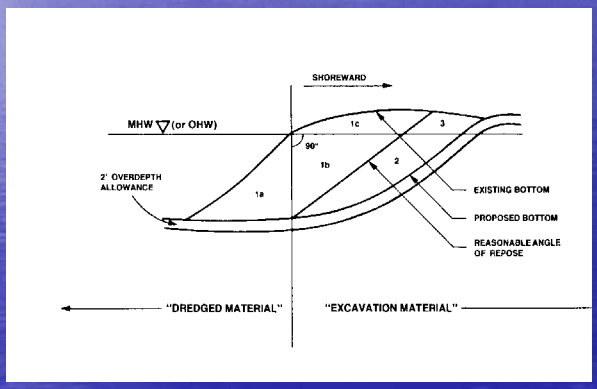
Background

- Definitions of dredged material
  - Clean Water Act
  - Corps/EPA "Green Book"
  - PSDDA Evaluation Procedures Technical Appendix (EPTA)
  - Others

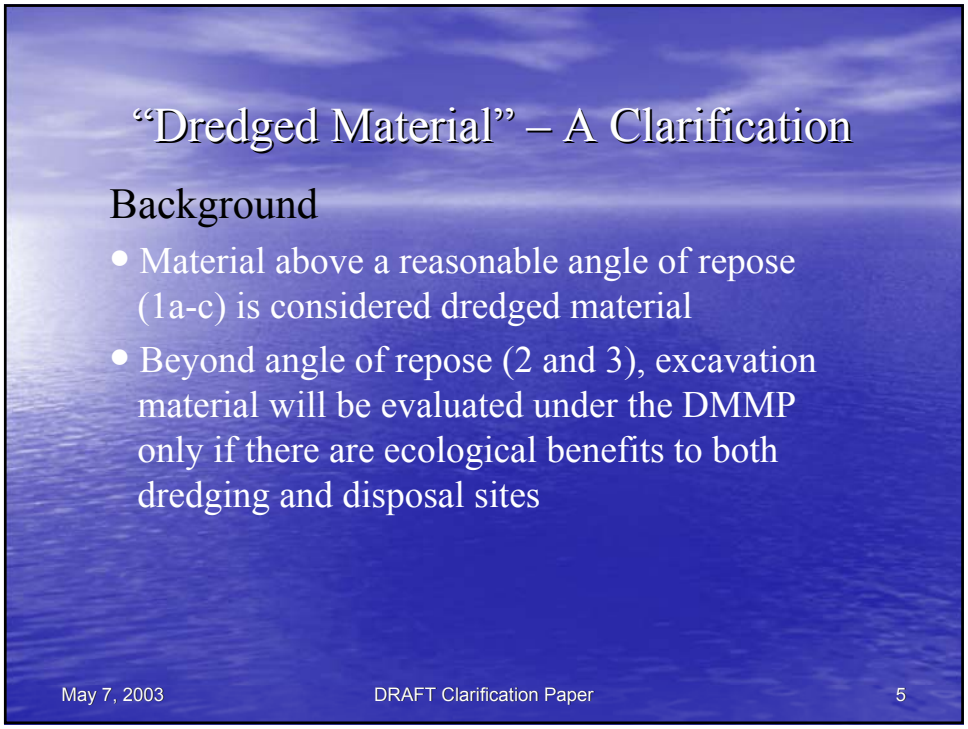
PP 13.3. "Dredged Material" - A Clarification (Background continued)

"Dredged Material" – A Clarification

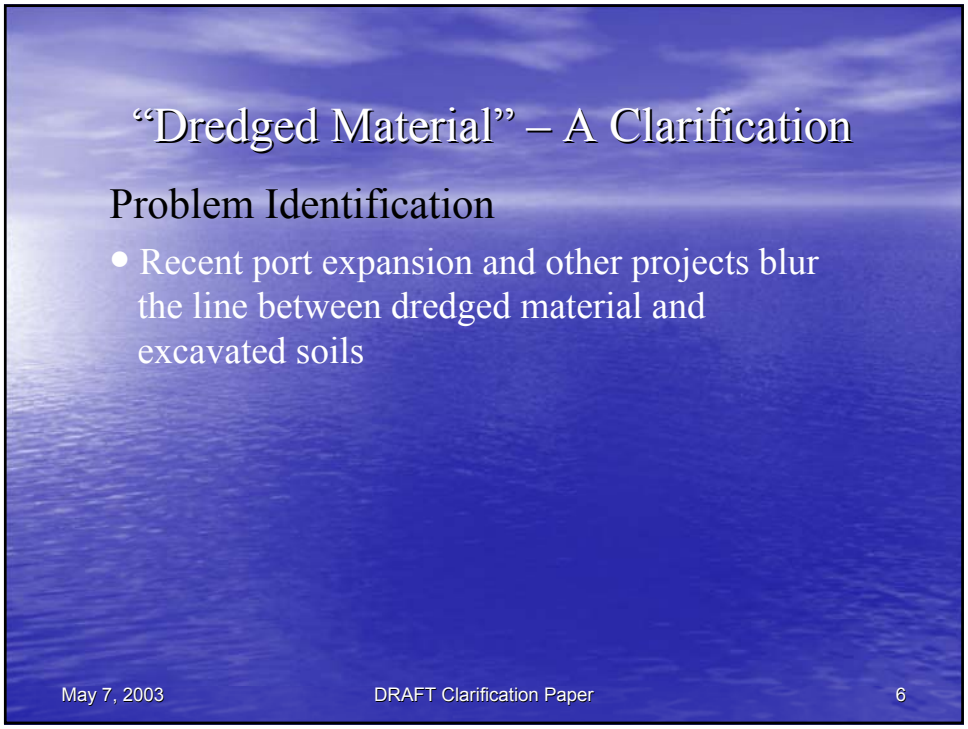
Background: EPTA dredging prism



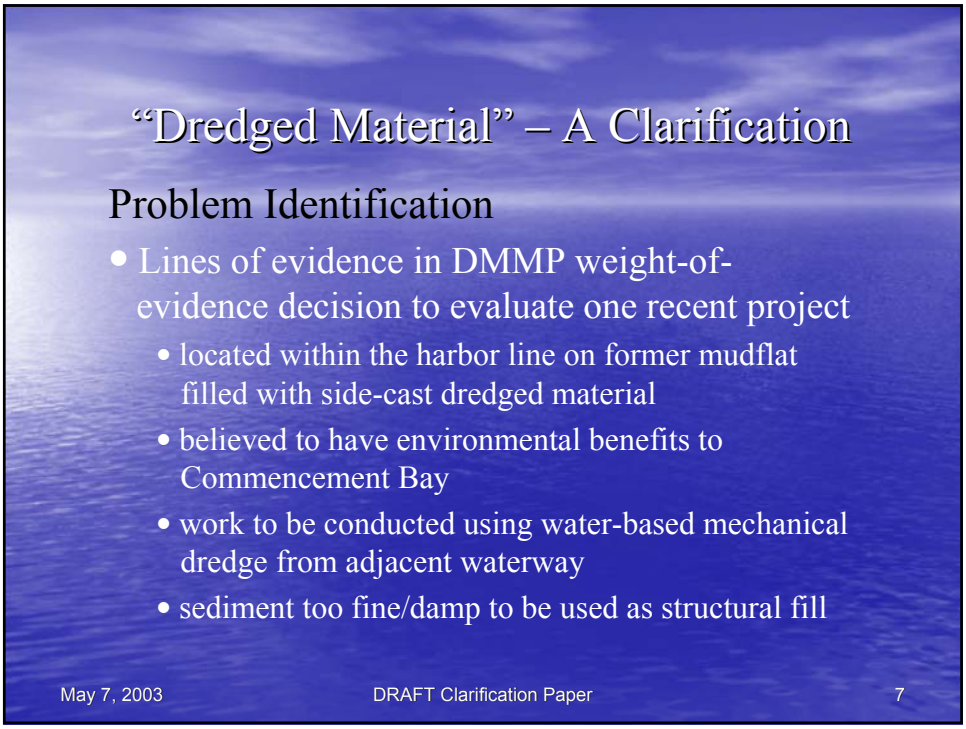
PP 13.4. "Dredged Material" - A Clarification (Background: EPTA dredging prism)



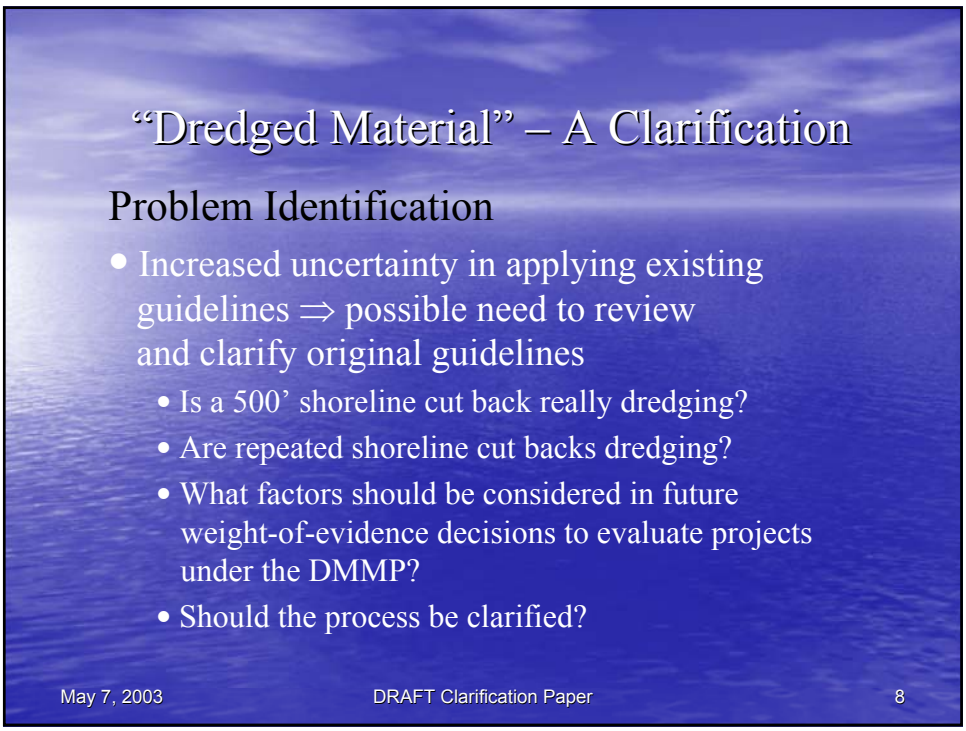
PP 13.5. "Dredged Material" - A Clarification (Background continued)



PP 13.6. "Dredged Material" - A Clarification (Problem Identification)



PP 13.7. "Dredged Material" - A Clarification (Problem Identification)



PP 13.8. "Dredged Material" - A Clarification (Problem Identification continued)

"Dredged Material" – A Clarification

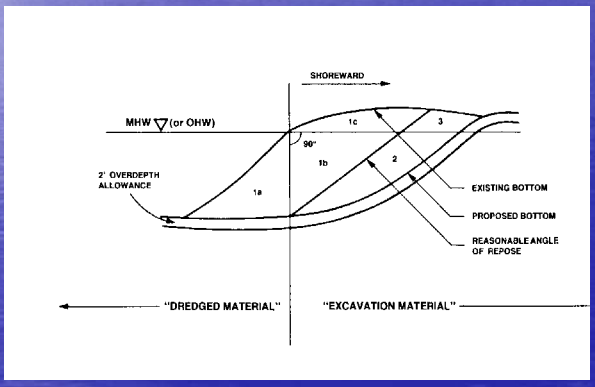
Proposed Clarification

- No need to change working definition of dredged material
- The process does need clarification
  - The issue should be raised at a pre-application meeting, e.g., does the applicant plan to remove material that lies beyond a reasonable angle of repose?
    - If not, OK

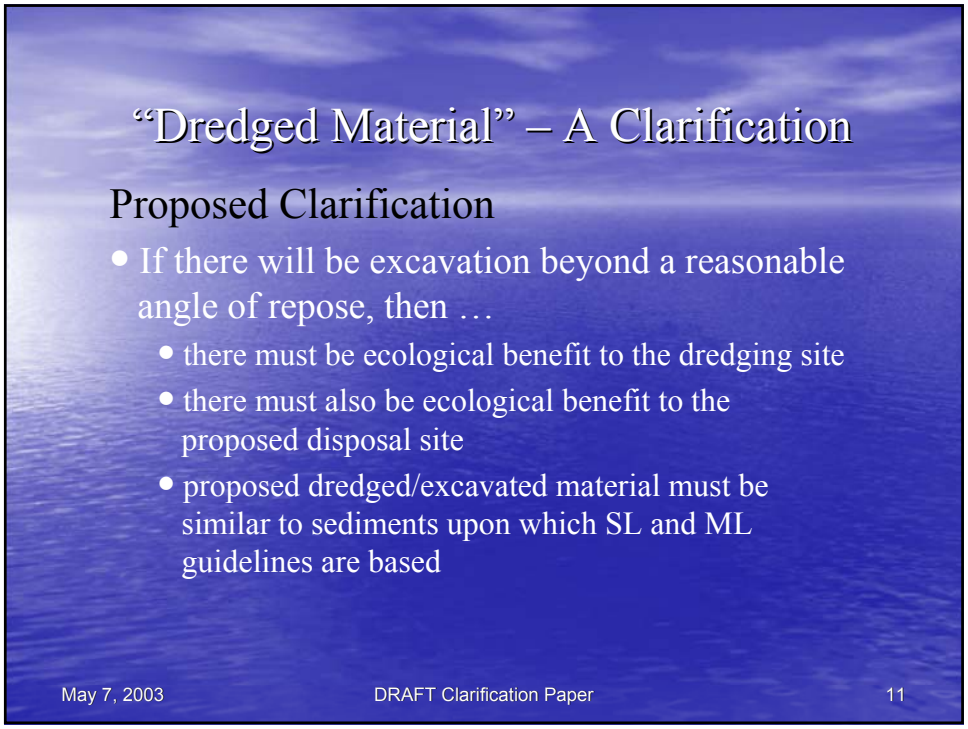
PP 13.9. "Dredged Material" - A Clarification (Proposed Clarification)

"Dredged Material" – A Clarification

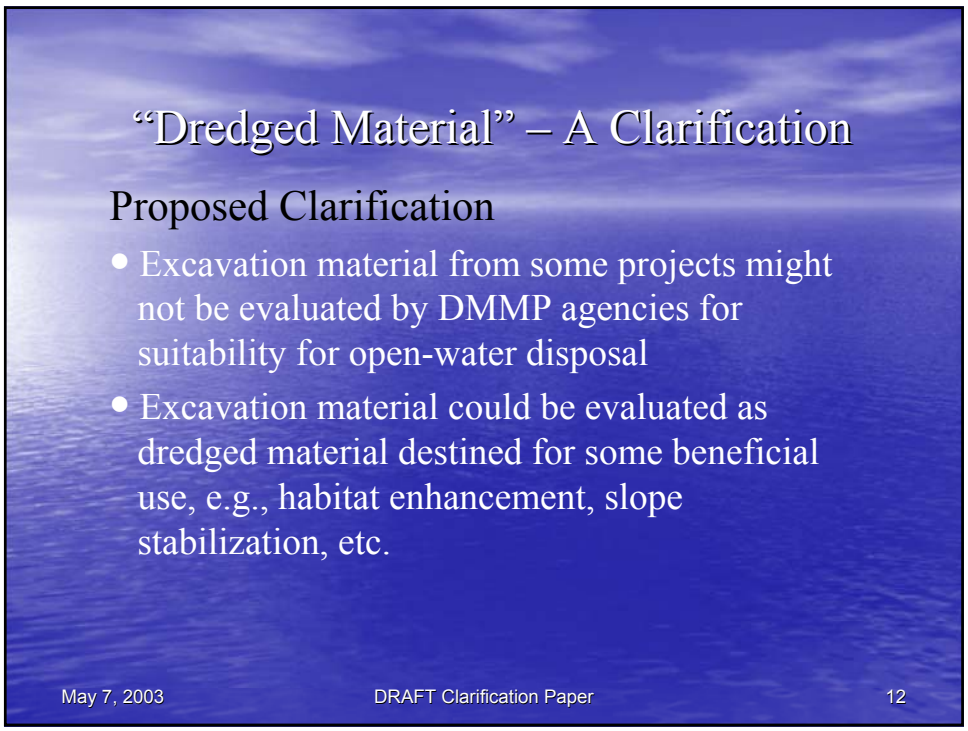
Background: EPTA dredging prism cross-section



PP 13.10. "Dredged Material" - A Clarification (Background: EPTA dredging prism cross-section)



PP 13.11. "Dredged Material" - A Clarification (Background continued)



PP 13.12. "Dredged Material" - A Clarification (Background continued)

Regional Sediment Evaluation Team Workshop Summary

Presented to Pacific Northwest Chapter of SETAC

Howard L. Cumberland
Taku Fuji, Ph.D.

April 19, 2003

HARTCROWSER

PP 14.1. Regional Sediment Evaluation Team Workshop Summary

Acknowledgments

- Jim Reese: Northwestern Division Corps
- John Malek: EPA Region 10
- Tim Sherman: Portland District Corps

HARTCROWSER

PP 14.2. Acknowledgements

Introduction

- Northwest Regional Dredging Team (RDT) Formed – April 2002 by EPA Region 10 and Northwestern Division Corps
- Northwest for purposes of this charter is defined as inclusive of the States of Washington, Oregon, and Idaho
- Purpose of RDT is to facilitate resolution of local and regional dredging/sediment issues

HARTCROWSER

PP 14.3. Introduction

Regional Dredging Team (RDT)

Regional Dredging Team. The Regional Dredging Team (RDT) as currently formed consists of representatives from the following Federal agencies: Corps of Engineers, Northwestern Division (NWD), EPA Region 10, USFWS, NOAA/Office of Ocean and Coastal Resource Management, NOAA Fisheries (NMFS), and Department of Transportation/U.S. Maritime Administration. Other Federal, State agencies, and Tribal Governments, may participate as liaisons, as needed. The RDT is co-chaired by Corps of Engineers NWD and EPA Region 10.

HARTCROWSER

PP 14.4. Regional Dredging Team (RDT)

RDT Vision

Ensure that dredging and disposal of sediments from Northwest harbors and channels is conducted in a timely and cost effective manner while meeting the appropriate assessment and environmental protection/restoration/enhancement goals.

HARTCROWSER

PP 14.5. RDT Vision

Goals of the RDT

The Regional Dredging Team will facilitate communication, coordination, and resolution of dredging issues among the participating Federal agencies, and will serve as a forum for promoting the implementation of the recommendations in the Report to the Secretary of Transportation, ***The Dredging Process in the United States: An Action Plan for Improvement (December 1994)*** (the Report) and subsequent recommendations of the National Dredging Team already functioning as recommended in the plan.

HARTCROWSER

PP 14.6. Goals of the RDT

Dredged Material Evaluation Framework (DMEF)

- DMEF will consolidate the existing regional guidance manuals (e.g., PSSDA, Grays Harbor and Willapa Bay, Washington, Lower Columbia River, McNary and Lower Snake River Reservoirs, etc.).
- Regional DMEF be technically applicable throughout the Pacific Northwest for both freshwater and marine sediments and potentially include upland disposal as well as in-water disposal.

HARTCROWSER

PP 14.7. Dredged Material Evaluation Framework (DMEF)

Regional Sediment Evaluation Team (RSET)

- The RSET, a multi-agency group, has been formed under the auspices of the RDT to revise the existing regional DMEF for use by all NW Corps Districts, EPA Region 10, NMFS, USFWS, and other federal and state agencies that require sediment quality evaluation procedures. The RSET will expand and replace the Regional Management Team (RMT) defined in the existing DMEF.

HARTCROWSER

PP 14.8. Regional Sediment Evaluation Team (RSET)

RSET Workshop

Three-day technical scoping workshop (Workshop) on September 11 - 13, 2002

Corps – NW Division and Portland, Seattle, and Walla Walla Districts, Waterways Experiment Station (WES)

EPA Region 10

NOAA – NMFS Portland and Boise offices, NW Science Center

USFWS

Oregon Department of Environmental Quality (DEQ)

Washington Department of Ecology (WDOE)

Washington Department of Natural Resources (DNR)

Port of Vancouver

Port of Portland

Port of Coos Bay

Severn Trent Laboratories

Hart Crowser – Technical Program Contractor

Carie Fox Mediation

HARTCROWSER

PP 14.9. RSET Workshop

RSET Workshop - Purpose

- Develop the scope for preparing an overall plan and process for updating the existing Columbia River DMEF
- Gauge the level of agency support for revising the existing DMEF and expanding it to include evaluation of sediments throughout the entire Washington, Oregon, and Idaho regions
- Identify technical and policy issues needed to be addressed during the revision process

HARTCROWSER

PP 14.10. RSET Workshop - Purpose

Technical and Breakout Sessions

- **Structure of workshop**
  - "Ideal" and "Realistic" DMEF manual
  - Breakout sessions on Policy, Biology, Chemistry Issues
  - Scope of Work Matrix development
  - Path forward

HARTCROWSER

PP 14.11. Technical and Breakout Sessions

General Consensus

- Developing a regional DMEF for the Northwest was an extremely worthwhile process even though there are a number of policy and technical challenges to resolve
- Need an improved and comprehensive process to make consistent and accurate management decisions
- Need sustained management support

HARTCROWSER

PP 14.12. General Consensus

General Technical Needs

- Tiered testing approach to evaluating sediments
- Comprehensive sampling and testing methods to adequately characterize sediment
- Site-specific flexibility based on geographic and watershed issues
- Consistent evaluation procedures to serve multiple objectives
- Water quality testing methods for disposal actions
- A mechanism to update the manual

HARTCROWSER

PP 14.13. General Technical Needs

Specific Chemistry and Biological needs

- Effects-based testing that will be protective of all species including endangered fish
- Freshwater and marine sediment interpretive guidelines and screening levels
- Use and acceptance of rapid screening tools for sediment chemistry and toxicology
- Appropriate use and interpretation of biological community study data
- Focus chemical analytes list
- Regional chemistry/toxicity database

HARTCROWSER

PP 14.14. Specific Chemistry and Biological needs

December Meeting

- Complete some of the less controversial and time consuming tasks
- Determine scope of work items
- Form technical sub-committees
- Review and approve an agency partnering agreement and public involvement plan, and
- Begin the tribal involvement process

HARTCROWSER

PP 14.15. December Meeting

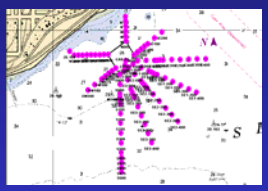
Where Are We Now????

- No Funding, but Strong Desire to get Process Moving or go at forward using everyone's own initiative – Get FUNDING!!
- Identified technical sub-committees
- Have the Regional Administrators of the RDT sign charter
- Outreach to public, Representatives of Oregon DSL, Idaho resource agencies, Tribes, and Washington Ports
- Prepare the DMEF outline for review RSET and comment

HARTCROWSER

PP 14.16. Where Are We Now????

SPI RESULTS FROM THE PSNS SURVEY: *Proof that Newton's 3rd Law Is Still True!!*

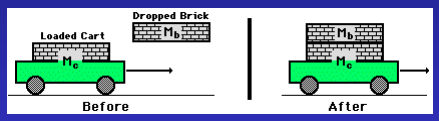


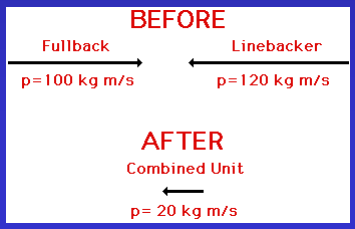
by
Joe Germano

Germano & Associates
Bellevue, WA

Lesson 3: The Law of Momentum Conservation

Momentum Conservation Principle





PP 15.1. SPI Results for the PSNS Survey: Proof that Newton's 3rd Law is Still True!!

REVEALING THE GOODS....

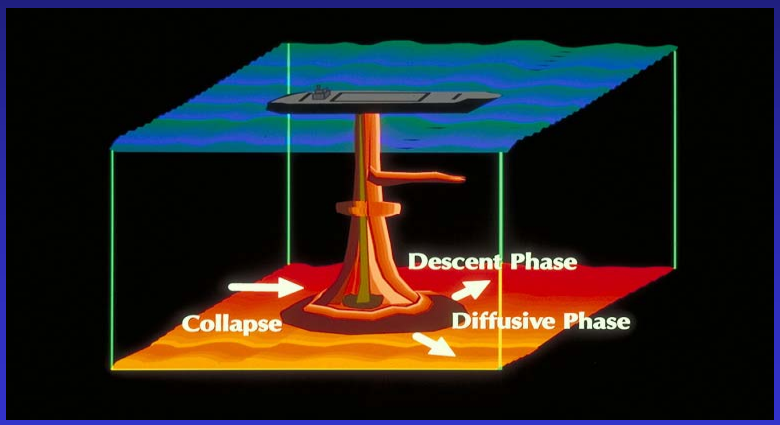
- *Dredged material has spread out 100-200 meters in all directions from the CAD boundary*
- *These results are similar to those found at other disposal site and CAD cell investigations in Puget Sound, Long Island Sound, New York, Massachusetts Bay, Los Angeles, Hong Kong, and off CA coast*

PP 15.2. Revealing the Goods

Dredging & Disposal – An Overview

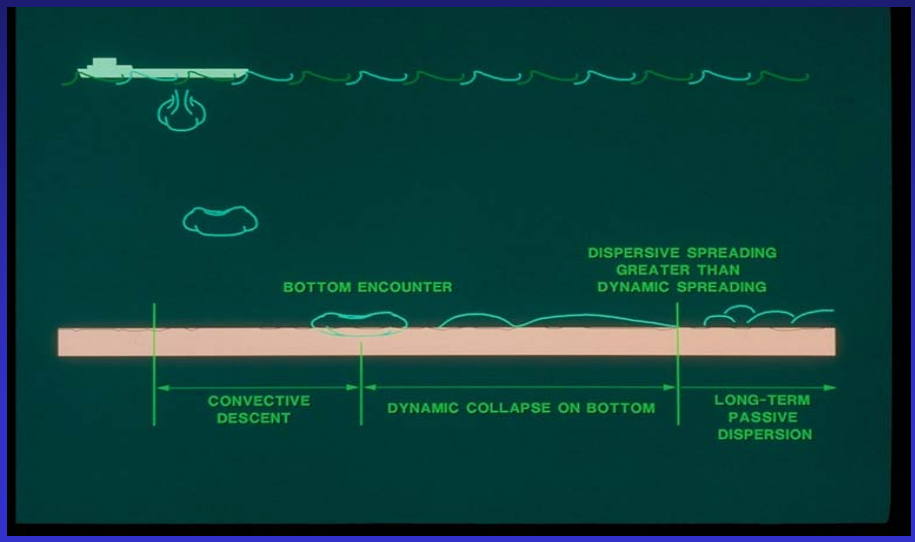
PP 15.3. Dredging & Disposal - An Overview

A Brief Review of the Physics of Dredged Material Disposal



PP 15.4. A Brief Review of the Physics of Dredged Material Disposal

A Brief Review (cont.)



PP 15.5. A Brief Review (cont.)

SOME CASE STUDIES TO ILLUSTRATE

- *FVP Program, Long Island Sound*
- *Massachusetts Bay Disposal Site*
- *NY Dioxin Capping Project*
- *Los Angeles Harbor Borrow Pit Demo*
- *Los Angeles Harbor – Pier 400*
- *Palos Verdes Shelf Capping*
- *Bremerton PSNS Results*

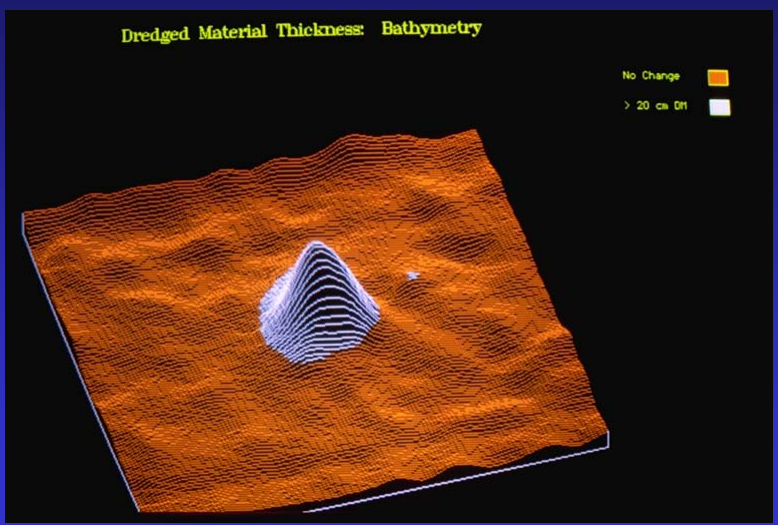
PP 15.6. Some Case Studies to Illustrate

FVP – Long Island Sound

- *60 ft. water depth*
- *50,000 cubic yards of fine-grained, highly fluid (>60% water)muds to be disposed*
- *Tremendous concern prior to project initiation that material would never reach the bottom*

PP 15.7. FVP - Long Island Sound

Bathymetry depth difference at FVP Site Central Long Island Sound



PP 15.8. Bathymetry depth difference at FVP Site Central Long Island Sound

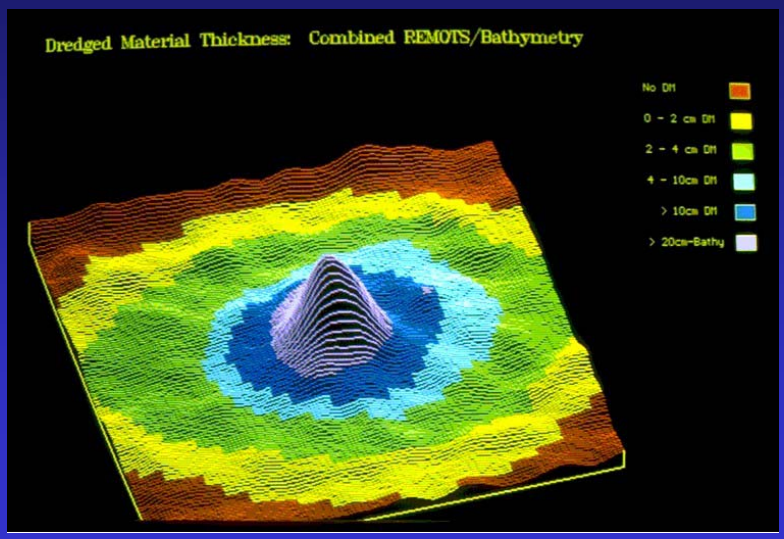
SPI Baseline Survey, 200m S

PP 15.9. SPI Baseline Survey, 200m S

SPI Results – Post Disposal

PP 15.10. SPI Results - Post Disposal

FVP Integrated SPI & Bathymetry



PP 15.11. FVP Integrated SPI & Bathymetry

Lessons Learned

- *WES dumping models inaccurate*
- *45% of volume contained in thin apron of material*
- *If one relied on acoustic methods alone, 95% of area affected by disposal would have gone undetected*

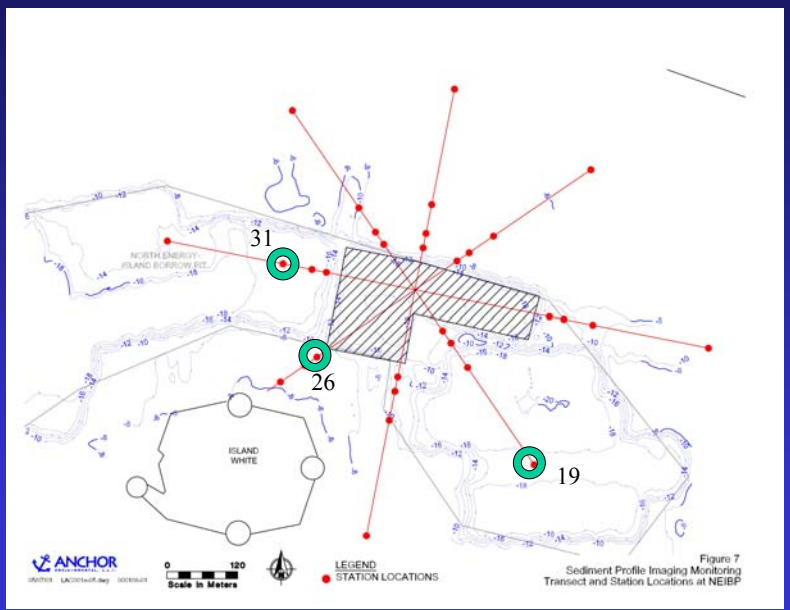
PP 15.12. Lessons Learned

SOME CASE STUDIES TO ILLUSTRATE

- *FVP Program, Long Island Sound*
- *Massachusetts Bay Disposal Site*
- *NY Dioxin Capping Project*
- *Los Angeles Harbor Borrow Pit Demo*
- *Los Angeles Harbor – Pier 400*
- *Palos Verdes Shelf Capping*
- *Bremerton PSNS Results*

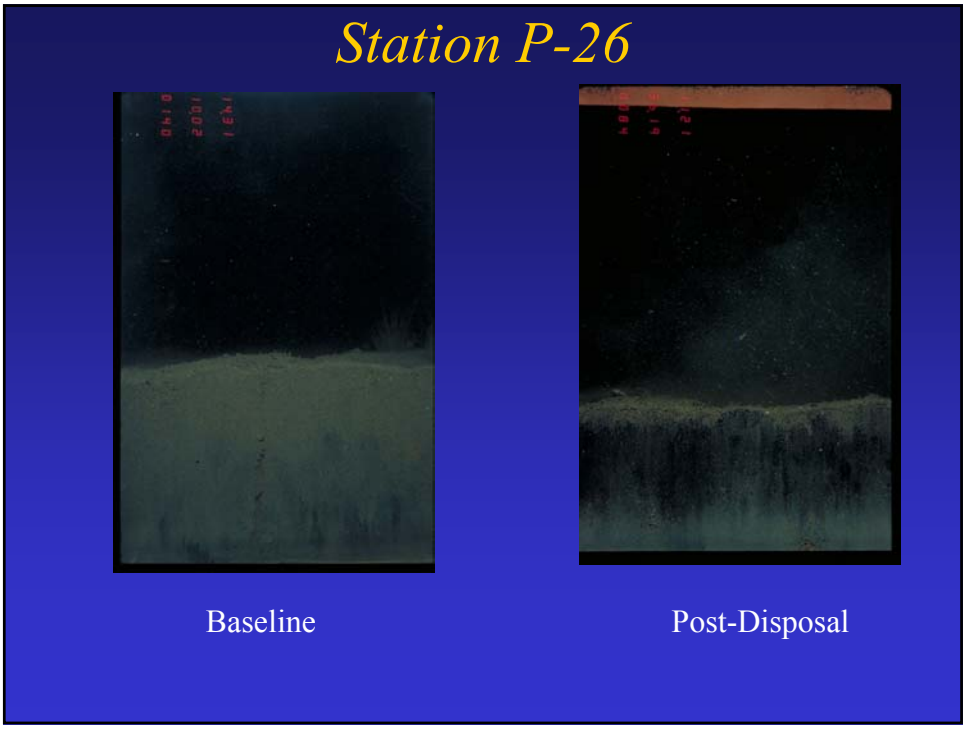
PP 15.13. Some Case Studies to Illustrate

SPI Sampling Grid



PP 15.14. SPI Sampling Grid

PP 15.15. Station P-31



PP 15.16. Station P-26

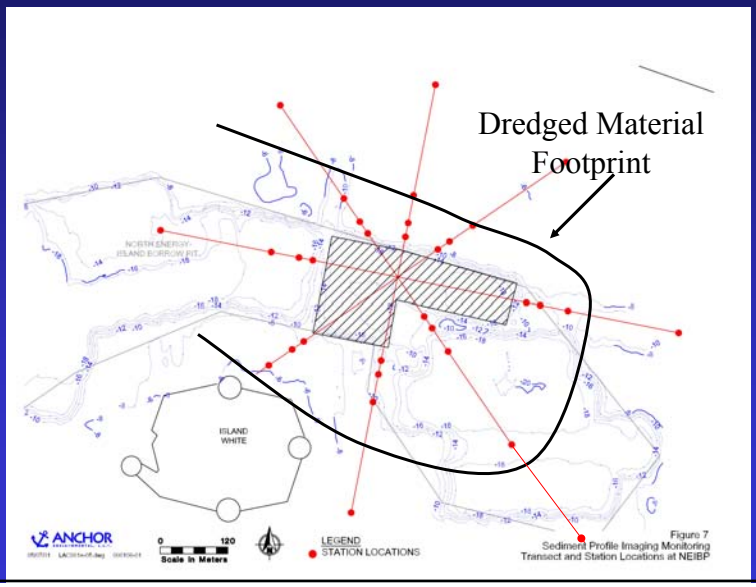
Station P-19

Baseline

Post-Disposal

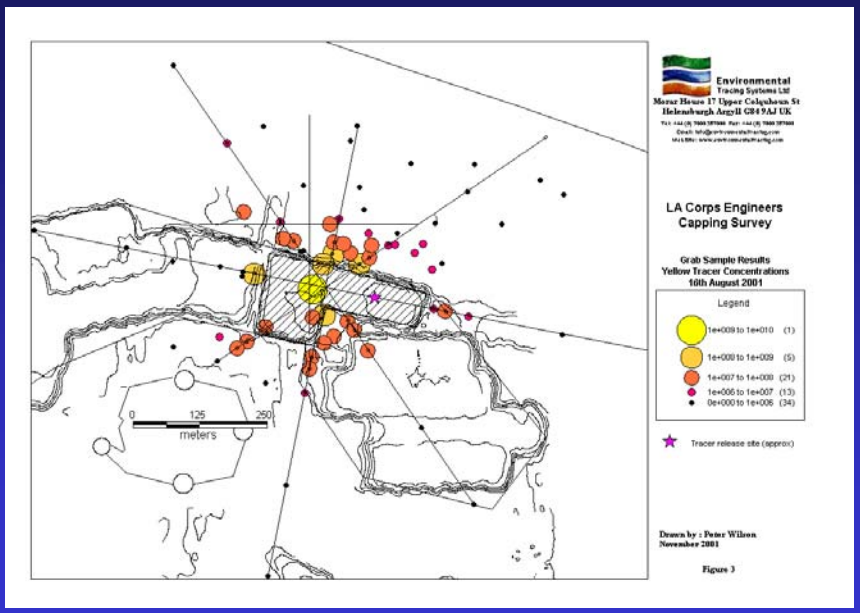
PP 15.17. Station P-19

Final Map of Contaminated Material (Pre-Cap)



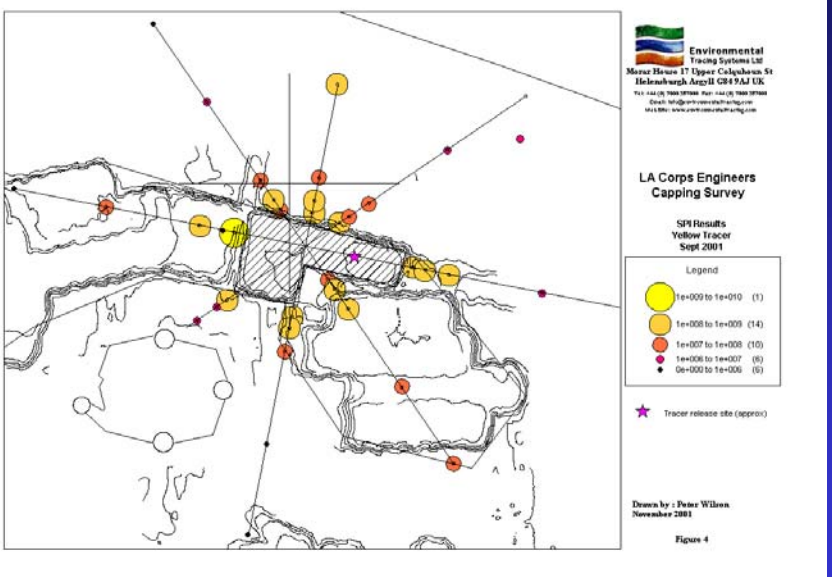
PP 15.18. Final Map of Contaminated Material (Pre-Cap)

Fluorescent Tracer Results



PP 15.19. Fluorescent Tracer Results

Tracer Results (cont)



PP 15.20. Tracer Results (cont)

Sediment Profile Image with Tracer

PP 15.21. Sediment Profile Image with Tracer

Lessons Learned:

- *WES dump models inaccurate*
- *SPI results showed same pattern as fluorescent tracer results*
- *Footprint pattern and spread of dredged material similar to those found on level-bottom disposal mounds*
- *Given enough energy, mud can flow uphill*

PP 15.22. Lessons Learned

SOME CASE STUDIES TO ILLUSTRATE

- *FVP Program, Long Island Sound*
- *Massachusetts Bay Disposal Site*
- *NY Dioxin Capping Project*
- *Los Angeles Harbor Borrow Pit Demo*
- *Los Angeles Harbor – Pier 400*
- *Palos Verdes Shelf Capping*
- *Bremerton PSNS Results*

PP 15.23. Some Case Studies to Illustrate

Pier 400 Project –Los Angeles

PP 15.24. Pier 400 Project - Los Angeles

Pier 400 – Basic Facts

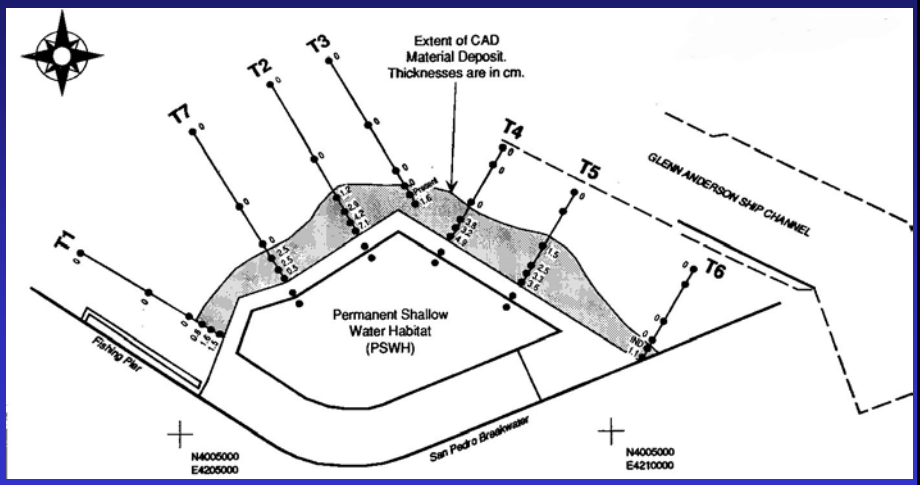
- *Permanent Shallow Water Habitat (PSWH) constructed as a foraging area for Least Terns (state endangered species) was a CAD site*
- *Area prior to construction was –40 to –45 ft. MLLW*
- *2 phases of dike construction – 1st phase was 10-15 ft above ambient seafloor depth, followed by CAD material placement*
- *Final phase built dikes to –15 ft. MLLW, with fill to –20 ft. MLLW*

PP 15.25. Pier 400 - Basic Facts

SPI Example from Monitoring Phase of Project

PP 15.26. SPI Example from Monitoring Phase of Project

Pier 400 PSWH Final Footprint



PP 15.27. Pier 400 PSWH Final Footprint

Lessons Learned:

- *Dredged material spread 150-200 meters beyond retaining walls of dikes*
- *Disposed muds once again flowed uphill (conservation of momentum)*
- *If bottom dumping cannot be contained within diked CAD with minimum of water depth, one can ALWAYS be assured that a subtidal CAD will always have material outside the designated boundary*

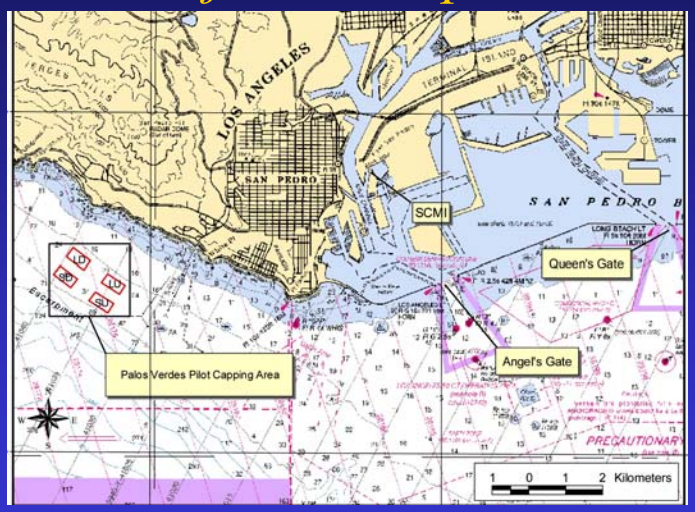
PP 15.28. Lessons Learned

SOME CASE STUDIES TO ILLUSTRATE

- *FVP Program, Long Island Sound*
- *Massachusetts Bay Disposal Site*
- *NY Dioxin Capping Project*
- *Los Angeles Harbor Borrow Pit Demo*
- *Los Angeles Harbor – Pier 400*
- *Palos Verdes Shelf Capping*
- *Bremerton PSNS Results*

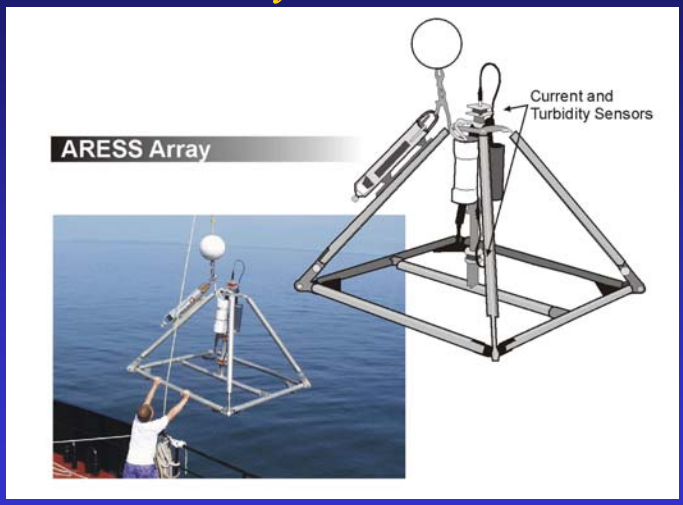
PP 15.29. Some Case Studies to Illustrate

Palos Verdes – Largest Capping Project Attempted



PP 15.30. Palos Verdes - Largest Capping Project Attempted

Near Bottom Currents & Turbidity Monitored

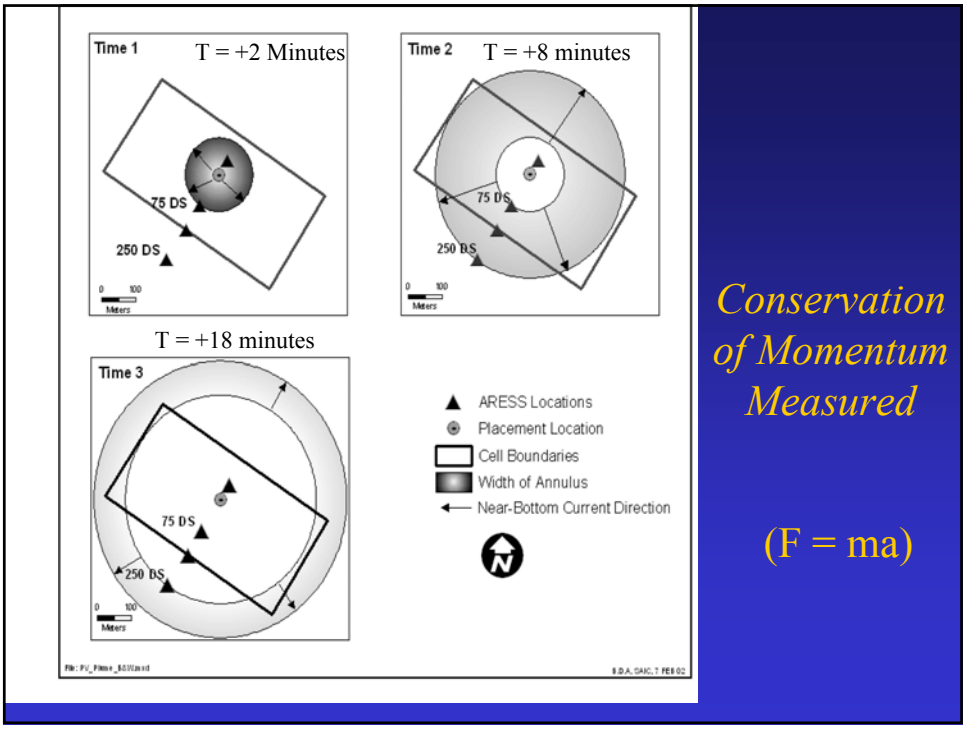


PP 15.31. Near Bottom Currents & Turbidity Monitored

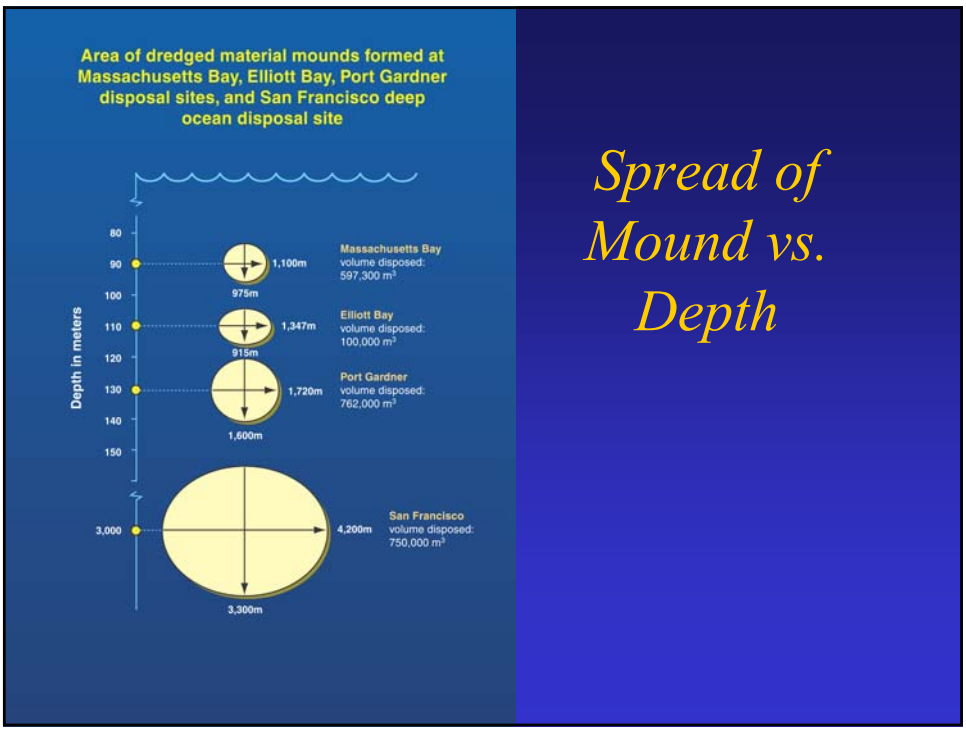
Array Results

- *Instruments placed at 1 upslope and 3 downslope locations*
- *Currents prior to disposal weak (0-10 cm/sec)*
- *During passage of surge current from disposal, speeds of 105 cm/sec measured 1.25 m above the bottom at the 75 m downslope array with return to background in 8 minutes*
- *High turbidity pulses lasted for same duration as intensified currents*

PP 15.32. Array Results

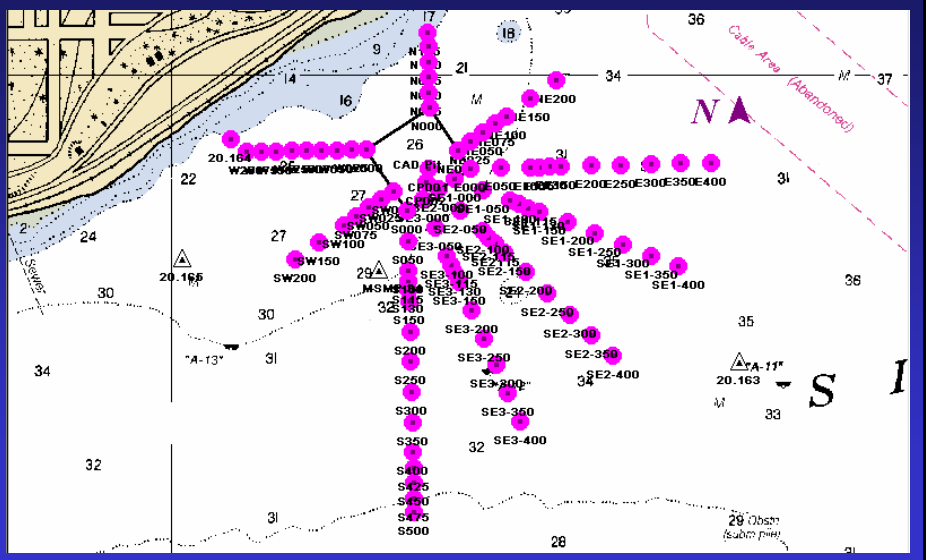


PP 15.33. Conservation of Momentum Measured



PP 15.34. Spread of Mound vs. Depth

PSNS RESULTS – August, 2002



PP 15.35. PSNS Results - August, 2002

PSNS – Ambient Bottom

Station E-250

Station E-300

PP 15.36. PSNS - Ambient Bottom

PSNS – Dredged Material

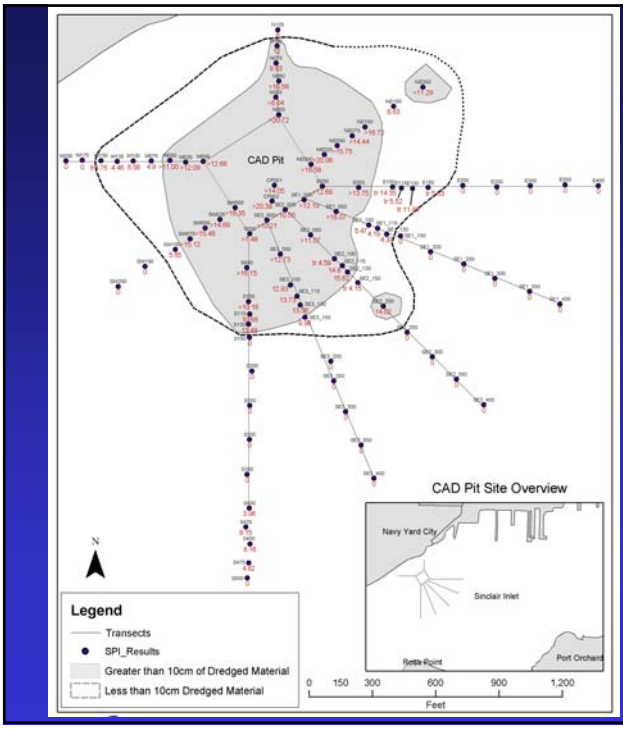
Station E-0

Station W-25

PP 15.37. PSNS - Dredged Material

PSNS – Inside CAD

PP 15.38. PSNS - Inside CAD



PSNS – Results

PP 15.39. PSNS - Results

Conclusions:

- *Dredged Material has spread from 100-200 meters out from the site boundary, particularly in the downslope direction*
- *Results were completely predictable and comparable to other disposal site results*

PP 15.40. Conclusions

Conclusions (cont)

- *Pro-active public outreach/education necessary to prevent misconceptions about project failure*

Monday, November 18, 2002

The Navy, a top polluter, botched cleanup

By Robert McClure
SEATTLE POST-INTELLIGENCER REPORTER

BREMERTON -- After polluting Sinclair Inlet for most of a century, it seemed that the U.S. Navy had finally cleaned up its act. The service dug up contaminated mud and sand under its docks here, and even crowed about saving millions on the job. **But last month, Navy officials had to admit that the work had spread contaminants over a large portion of the inlet, including state-owned bay bottom where they had been refused permission to dump.** The Navy has a proud history here, building and repairing ships that helped the nation win two world wars. But it has also been a prolific polluter -- responsible for more than a dozen of the most contaminated spots around Puget Sound.
Much of the PCB contamination poisoning the Sound can be traced to naval operations. The highly toxic chemical has worked its way up the food chain to orcas, damaging their ability to reproduce.....

PP 15.41. Conclusions (cont)

Conclusions (cont.)

- *When planning CAD projects, always remember:*
  - *WES Dumping models inaccurate*
  - *Material will wind up outside site boundaries due to Newton's 3rd law (conservation of momentum) and operational errors*
  - *A combination of precision bathymetry and SPI should be used during disposal operations to confirm footprint location & plan capping operations*

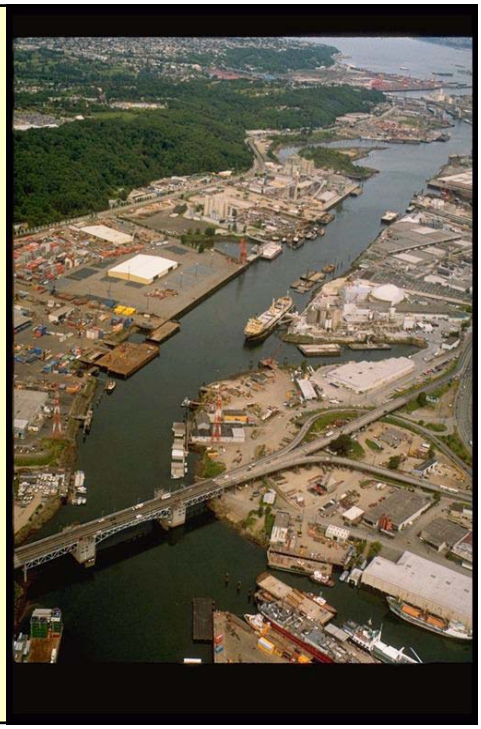
PP 15.42. Conclusions (cont.) (continued)

PP 15.43. Questions?

Lower Duwamish Waterway

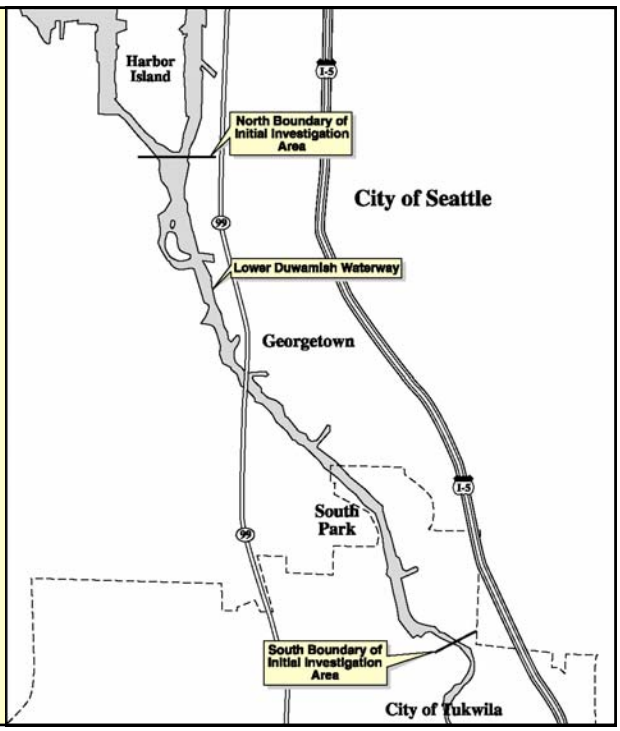
Remedial Investigation/Feasibility Study Update

Allison Hiltner
U. S. EPA



PP 16.1. Lower Duwamish Waterway Remedial Investigation/Feasibility Study Update

Lower Duwamish Waterway Superfund Study Area



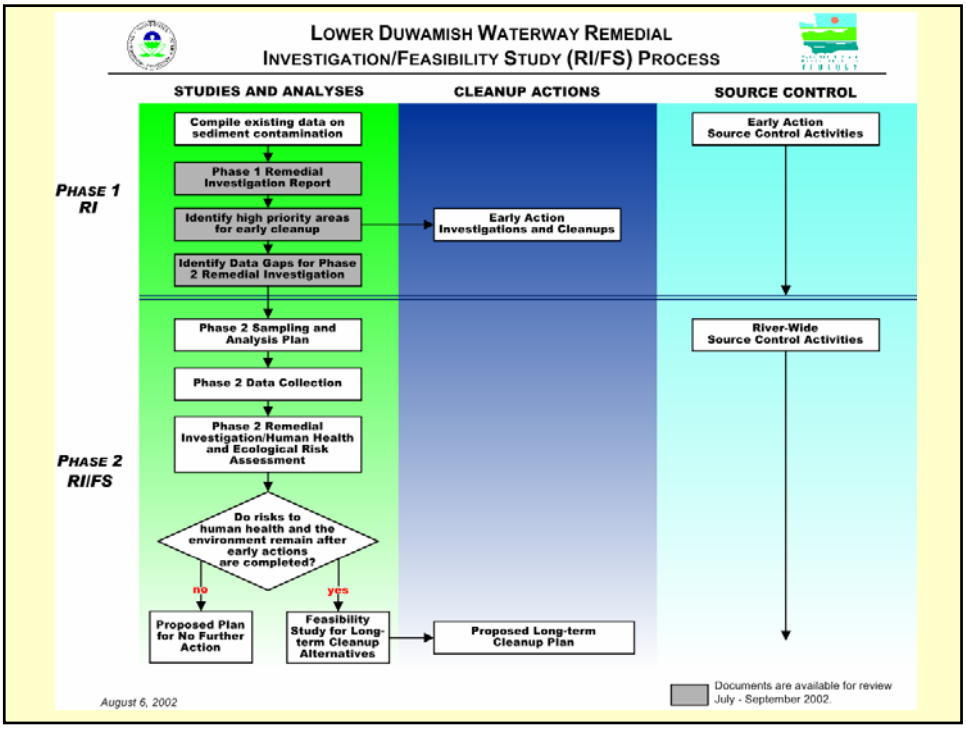
PP 16.2. Lower Duwamish Waterway Superfund Study Area

Lower Duwamish Waterway Superfund History

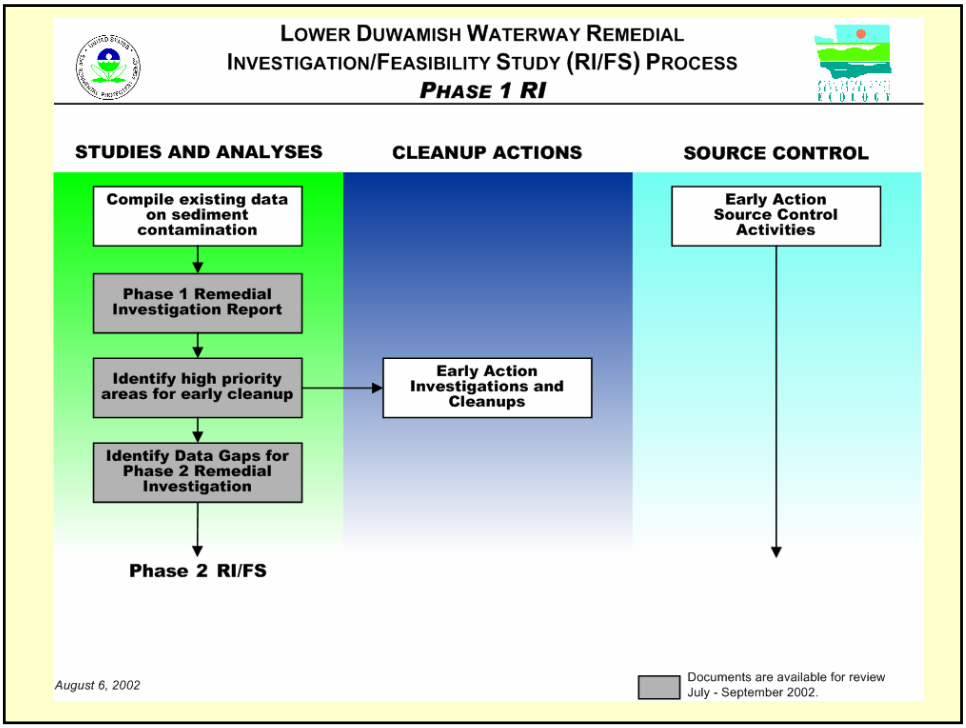
- **December 1, 2000**: Waterway proposed to EPA's National Priorities List (NPL)
- **December 20, 2000**: EPA, Ecology and Lower Duwamish Waterway Group* sign Administrative Order on Consent
- **September 13, 2001**: Waterway listed on NPL
- **May 3, 2002:** EPA/Ecology sign agreement regarding roles and responsibilities
- **July - September 2002:** Public comment on draft Phase 1 reports

*City of Seattle, Port of Seattle, King County, The Boeing Company

PP 16.3. Lower Duwamish Waterway Superfund History



PP 16.4. Lower Duwamish Waterway Remedial Investigation/Feasibility Study (RI/FS) Process



PP 16.5. Lower Duwamish Waterway Remedial Investigation/Feasibility Study (RI/FS) Process - Phase I RI

Lower Duwamish Waterway Source Control Activities

- Ecology is lead agency for source control, in partnership with EPA, King County, City of Seattle, Port of Seattle, and other public agencies
- Goal is to manage sources so that sediments meet State's standards and Duwamish cleanup goals
- Ecology is currently developing a Lower Duwamish Waterway Source Control Strategy and Plan
- Will coordinate with State's required Clean Water Plan (Total Maximum Daily Load)

PP 16.6. Lower Duwamish Waterway Source Control Activities

Lower Duwamish Waterway Phase 1 Remedial Investigation

- Summarizes existing information
- Human Health Risk Assessment
- Ecological Risk Assessment
- Discussion of Uncertainties

PP 16.7. Lower Duwamish Waterway Phase 1 Remedial Investigation

Human Health Risk Characterization

Adult fish consumption	**Cancer Risk**	**Hazard Quotient**
Arsenic	$1x10^{-3}$ (1 in 1,000)	3.2
cPAHs	$1x10^{-4}$ (1 in 10,000)	
PCBs	$3x10^{-4}$ (3 in 10,000)	10
Total	$2x10^{-3}$ (2 in 1,000)	15
Commercial netfishing		
Arsenic	$4x10^{-6}$ (4 in 1,000,000)	
Total	$7x10^{-6}$ (1 in 1,000,000)	<0.1
Beach play		
Arsenic	$2x10^{-6}$ (2 in 1,000,000)	
TCDD	$1x10^{-6}$ (1 in 1,000,000)	
Total	$6x10^{-6}$ (6 in 1,000,000)	<0.1

PP 16.8. Human Health Risk Characterization

Uncertainty Analysis

- What is the relationship between chemical concentrations in fish and chemical concentrations in sediment?
- Are consumption rates from the Suquamish Tribe realistic for the LDW?
- Are existing tissue chemistry data sufficient?
- Are arsenic concentrations in the LDW different than arsenic concentrations elsewhere in Puget Sound?

PP 16.9. Uncertainty Analysis

Results of Ecological Risk Assessment

	Chemicals of Potential Concern							
	Metals	**TBT**	**Mercury**	**DDTs**	**PCBs**	**PAHs**	**BEHP**	**Other Chemicals**
Benthic Community	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**
Crab	**X**	X	X		X			
Fish	**X**	**X**	**X**	X*	**X**	**X**		
Birds	**X**		**X**	X*	**X**		X	
Mammals	**X**				**X**			
Plants	**X**		X		X			

X Chemicals evaluated in the Phase 1 ecological risk assessment.

X Phase 1 results indicate potential for adverse effects due to these chemicals -- further study needed in Phase 2

* Insufficient data (more information needed)

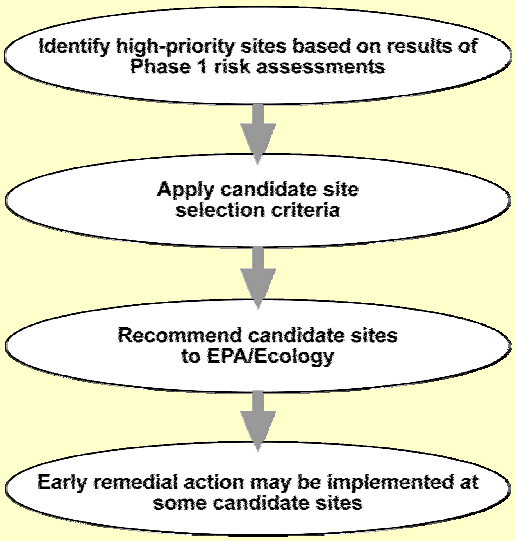
PP 16.10. Results of Ecological Risk Assessment

Uncertainty Analysis

- Were representative species appropriately selected?
- Did existing data adequately represent exposure to ecological species?
- Are existing toxicity data sufficient?

PP 16.11. Uncertainty Analysis

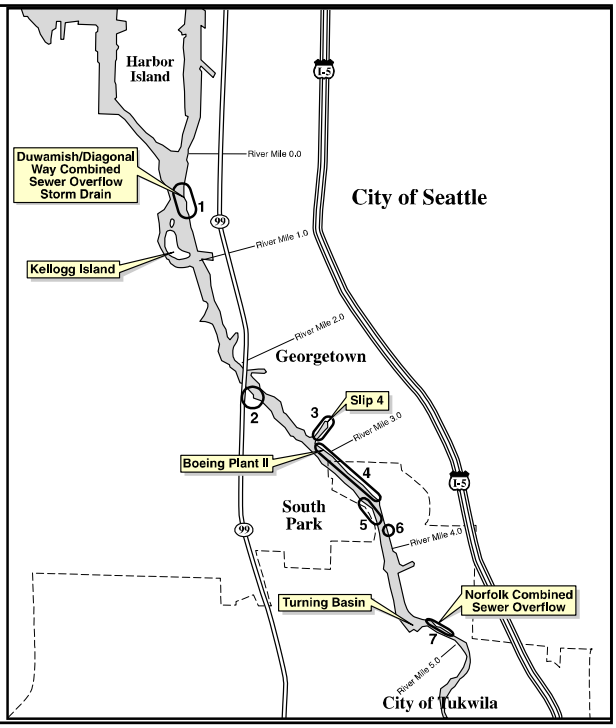
Identification of Candidate Sites for Early Action



PP 16.12. Identification of Candidate Sites for Early Action

Candidate Early Action Sites

1. Duwamish/Diagonal CSO
2. River mile 1.4, west side
3. Slip 4
4. Boeing Plant 2
5. Terminal 117/Malarkey
6. River mile 3.8, east side
7. Norfolk CSO



PP 16.13. Candidate Early Action Sites

Early Action Sites

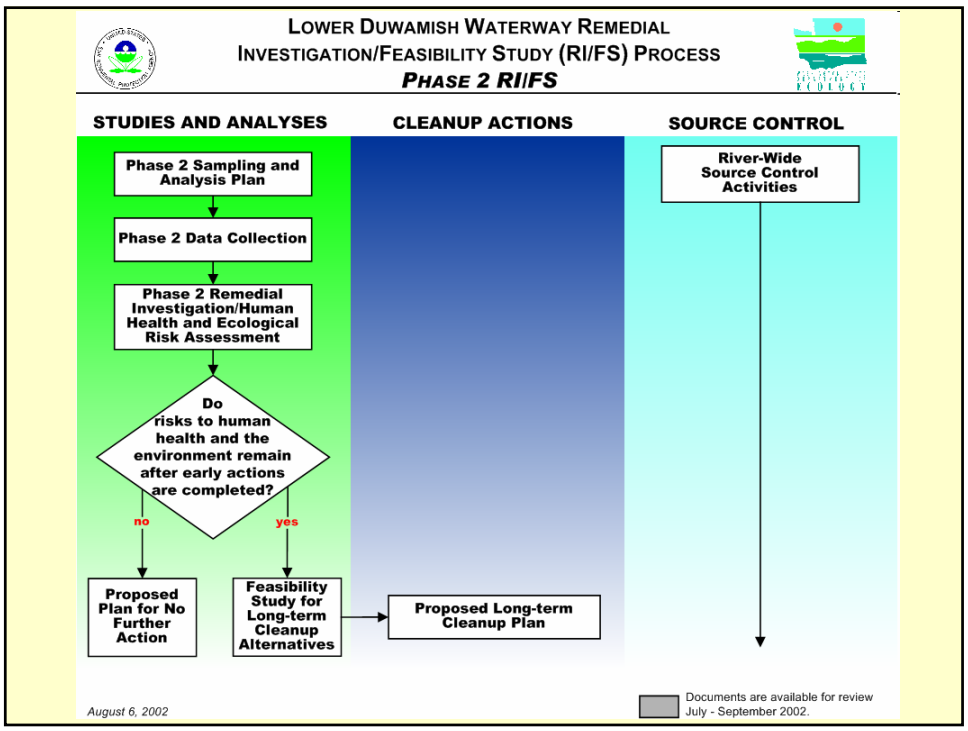
- Duwamish/Diagonal CSO/Storm Drain - cleanup to start December 2003
- Boeing Plant 2 - in design phase
- Slip 4 - sampling in 2003
- Malarkey/Terminal 117 - sampling in 2003

PP 16.14. Early Action Sites

Identification of Data Gaps

- Phase 2 data collection will include:
  - surface and subsurface sediment sampling
  - fish and shellfish tissue
  - benthic toxicity testing
- Draft Phase 2 Work Plan - July 2003

PP 16.15. Identification of Data Gaps



PP 16.16. Lower Duwamish Waterway Remedial Investigation/Feasibility Study (RI/FS) Process - Phase 2 RI/FS

Documents are available at these locations:

- EPA's Seattle Office
- Ecology's Bellevue Office
- Georgetown Gospel Chapel
- On the web:

  www.EPA.gov\R10earth - click on "index", then "L", then "Lower Duwamish Waterway"

PP 16.17. Documents are available at these locations.

Use of Silt Curtains in Dredging Projects

Presented to:

Sediment Management Annual Review Meeting

May 7, 2003

Presented by:

Clay Patmont

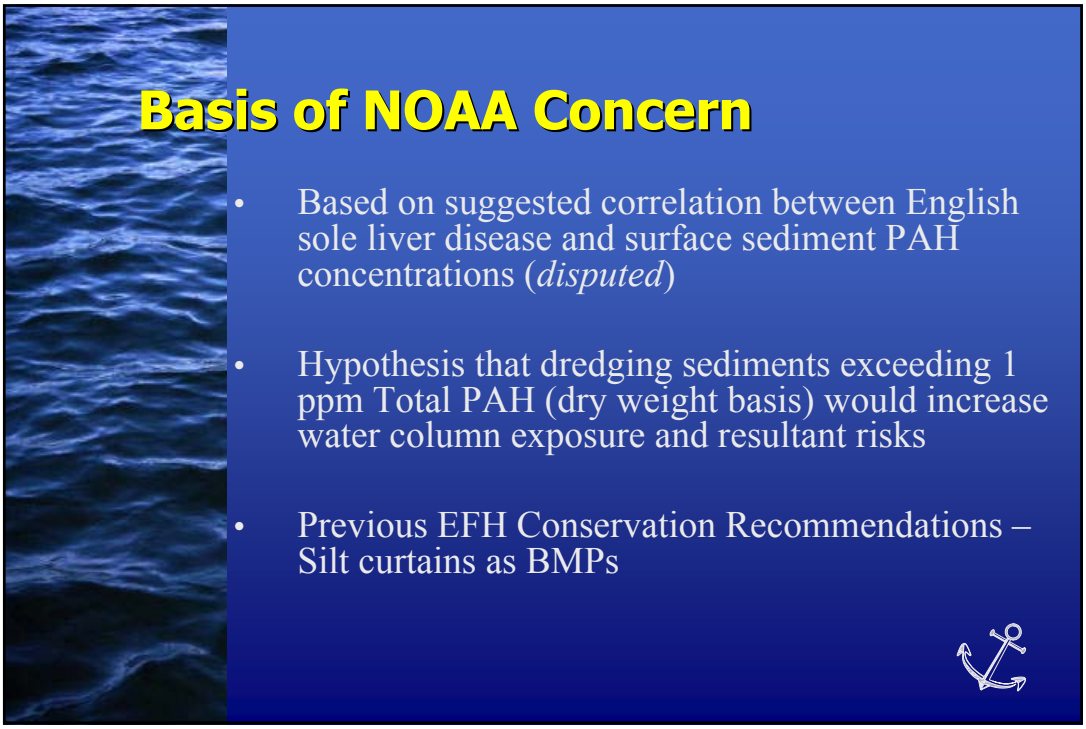
ANCHOR ENVIRONMENTAL, L.L.C.

PP 17.1. Use of Silt Curtains in Dredging Projects

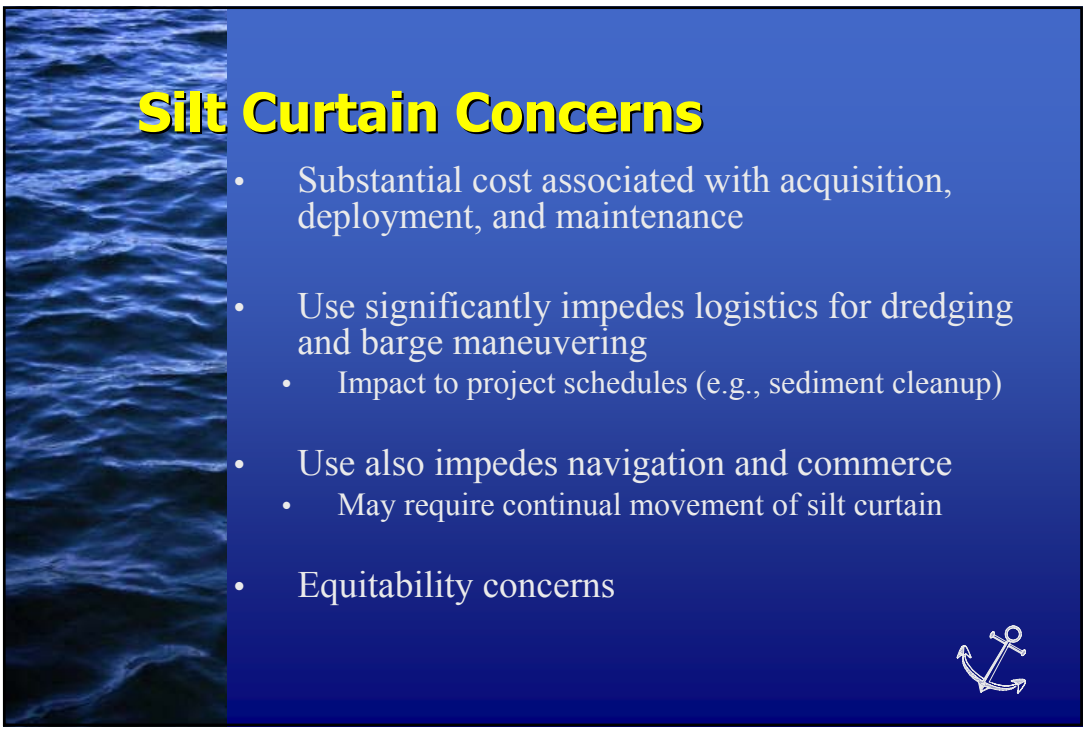
Issue Summary

- NOAA Fisheries concern that dredging may adversely affect Essential Fish Habitat (EFH) for listed groundfish
- EFH Conservation Recommendation – Silt curtains required when dredging sediments of potential concern (e.g., > 1 ppm Total PAHs)
- **Request** – DMMP evaluate Best Management Practices (BMPs) and provide recommendations

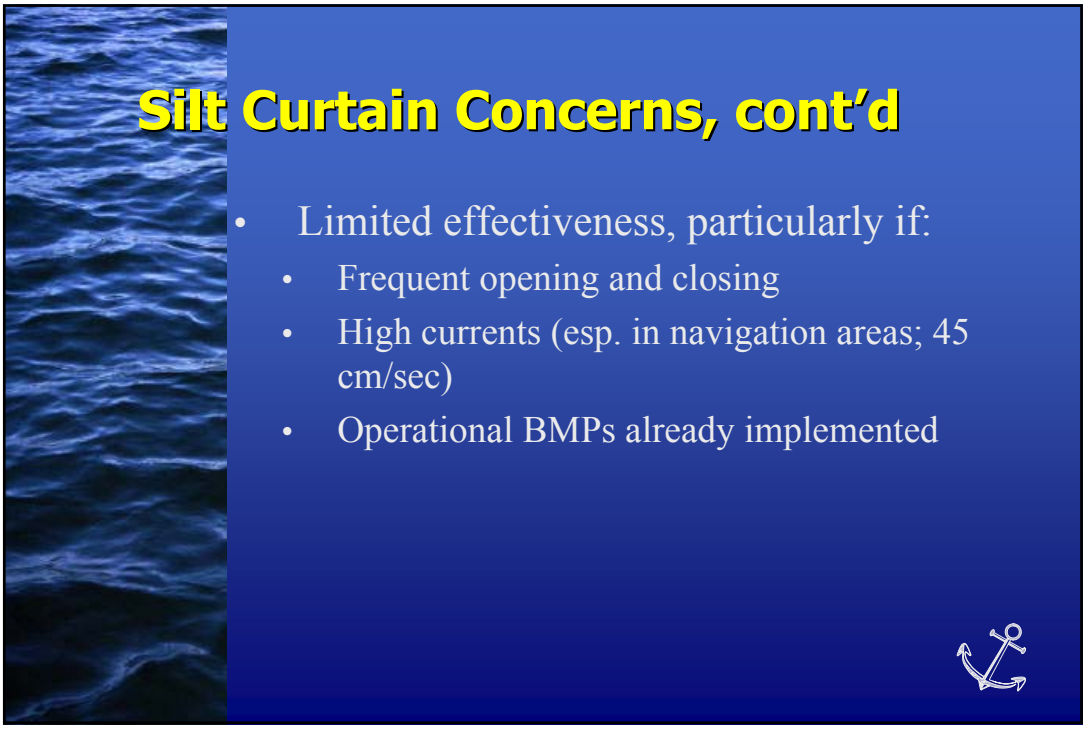
PP 17.2. Issue Summary



PP 17.3. Basis of NOAA Concern

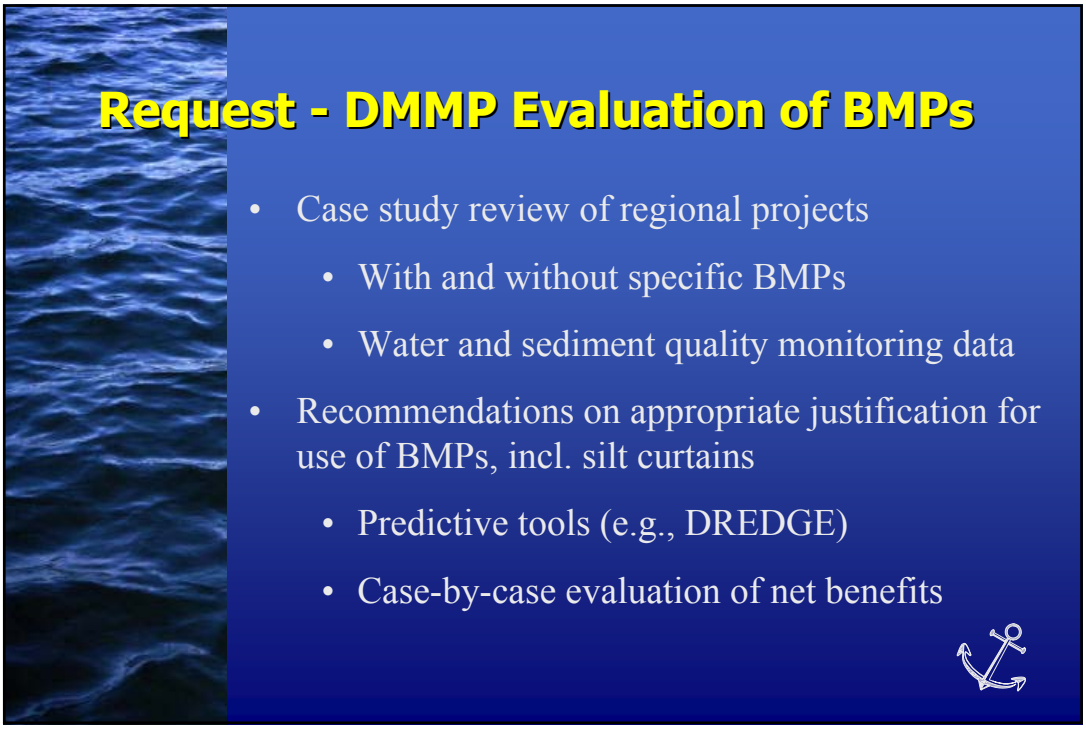


PP 17.4. Silt Curtain Concerns



PP 17.5. Silt Curtains, cont'd

PP 17.6. Operational BMPs Used in Puget Sound



PP 17.7. Request - DMMP Evaluation of BMPs